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☞ An asterisk (*) denotes an illustrated article

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WISHING TO MAKE THIS JOURNAL an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit Correspondence for publication from all among them who make the study of these subjects a pleasure, or a profession.

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THE FALL IN GAS STOCKS.

The recent depreciation in the selling price of gas shares is, it appears to us, a most remarkable case of being "scared before you are hurt." We have yet to hear of a single instance where the income of any company has been diminished in consequence of the introduction of the electric light; and, on the other hand, we know of no company whose real financial condition is not fully as good as it was a year ago, and in many instances the companies are much better off. There are evident signs of a gradual revival of business which, though it may be slow is, nevertheless, on that very account, all the more healthy.

To what extent shares of gas property have changed hands, during the recent scare, it is not easy to find out; but while the prices have fallen very much in almost all cases, still it is believed that the actual amount transferred has been very small. There are always timid people who, easily frightened, hasten to part with what they have; but there are always plenty of people to buy good things at any fair price, or less. The *Journal of Gas-Lighting* states, on what it deems very good authority, that French speculators are now buying London gas stocks at the present low figures, and says: "If this be a fact—and the source of our information is very good—it is most significant. It shows that those who have been really intimately acquainted with the electric light, and have had the best opportunities of estimating its chances of success as a competitor with gas, are still confident that the latter illuminating agent will hold its own against its new rival."

Similar facts may be shown as to stock sold here. In most cases, probably nine out of ten, stocks have been sold to close estates. It is easy to see that, in such cases, where estates are to be divided, there is no reason why those personally interested should bid *up* the stock. In almost every case where the stocks are not bought by the parties interested in estates, they are taken by investors who are posted as to the real condition of the companies whose stock they buy.

The advice that we would give to all shareholders is to hold fast to what you have, particularly as long as the *dividends* are regularly paid.

There will probably be a grand flourish concerning the illumination of Menlo Park before many days. But that will be no *good* reason for selling dividend paying gas stocks.

A PROPOSED NEW ASSOCIATION.

We would call the attention of our readers to a letter, in another column, suggesting the formation of a society to be composed of assistants and clerks employed in gas works. There is no doubt but that such an association would be of value to its members in many ways; but would not the same objects, together with some additional benefits, be attained by another method. What we would suggest in this connection would be the establishment of a class of "Junior" members in the American Gas-Light Association.

This is done in many societies, with great benefit to the Society, and to those admitted as "Juniors." This is a matter well worth the consideration of the Association.

There are, in some companies, it is true, some assistants and clerks who take little interest in gas-making; but, on the other hand, many young men take these positions to fit themselves for higher ones. These would be valuable members of the Association, while the increase in the numbers of the society would extend its usefulness, as well as increase its revenues.

At the same time those younger men who desired promotion would be in a position where their qualifications and general character might be judged of by the older members of the profession, and the judgments thus formed would be of value in the selection of assistants, as vacancies might occur.

We hope this matter will be thoroughly discussed through our columns.

ANNUAL MEETING OF AMERICAN SOCIETY OF CIVIL ENGINEERS.

At the annual meeting of the American Society of Civil Engineers, held November 6th, the following persons were elected officers for the year beginning November 6th, 1878:

President:	W. Milnor Roberts.
Vice Presidents:	Albert Fink.
	James B. Francis.
Secretary:	John Bogart.
Treasurer:	J. J. R. Croes.
Directors:	George S. Greene.
	William H. Paine.
	C. Vandervoort Smith.
	Thomas C. Clarke.
	Theodore G. Ellis.

Hovey's Patent Gas-Light Extinguisher.

We present to our readers, in the accompanying illustrations, an important improvement in gas-light extinguishers, recently patented by Wm H. Hovey, of Springfield, Mass.

In this device gravity alone is employed to automatically extinguish the gas-light; and there being no mechanical movements employed, the device is entirely certain and positive in its action, while it is thoroughly durable.

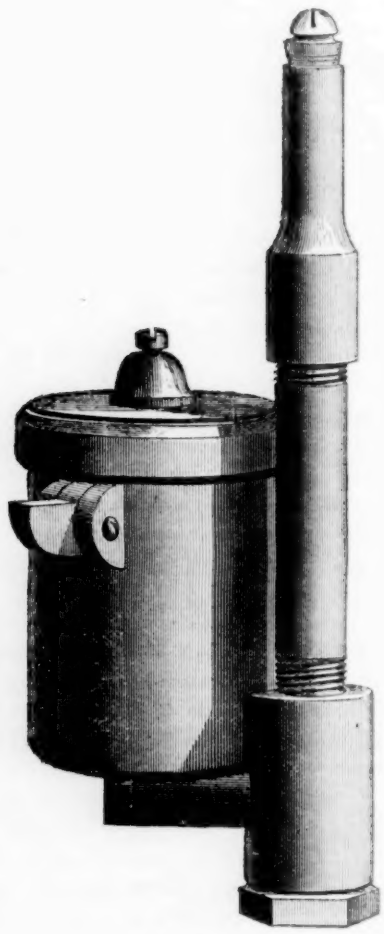

FIGURE 1.

Fig. 1 is a side elevation, and Fig. 2 a sectional view of the extinguisher, which consists of a barrel or cylinder, having in its bottom two annular recesses containing mercury, and receiving the two rings of a double cup inverted so that the rings of the cup enter the mercury. The outer ring, however, is the longer, and is arranged to never leave the mercury; hence it at all times seals the gas within the outer cup.

The gas from the main enters the inner cup through a hole in the centre of the bottom of the cylinder, and the weight of the cup, counteracting the pressure of the gas, acting upon the small area of the inner cup (the ring of the latter being immersed in mercury), seals the gas within the inner cup. By means of the lever shown in Fig. 1, however, the inverted cup can be lifted to the amount allowed between the end of the vertical spindle (which guides the cup) and the set-screw shown above it; and this movement causes the inner ring to leave the mercury, and the gas flows around the inner ring and into the outer ring of the cup; thence it passes through a hole, provided for the purpose, to the gas burner, its passage being denoted in the cut by the arrows.

It will be observed that so soon as the cup is lifted the gas is turned on, and the gas pressure acts upon the area within the large ring, where it will remain until the gas pressure is so reduced that the weight of the cup overcomes it, when the cup falls, and the gas is extinguished. The point at which this action occurs is regulated by a very simple means of loading the cup. But so soon as the cup has fallen, the gas pressure, acting on the small area of the inner cup only, is insufficient to lift it until assisted by the lever before referred to.

By loading all the cups in a street or district alike, or according to the elevations, all the lights in that street or district would extinguish themselves simultaneously so soon as the gas pressure was reduced to the required point. Or, if so adjusted, different lights would extinguish themselves at different times; but the reduction of the pressure upon the street lights does not affect the steady supply of gas in dwellings.

The manufacture and sale of this novel and useful improvement is in the hands of Messrs. Fairbanks & Co., the well-known scale manufacturers, 311 Broadway, who will send as samples any number desired, with full directions as to filling, weighting, and adjusting.

The great waste of gas and the expense attending the extinguishing of street lights is well known to all managers of gas companies. The patent which Fairbanks & Co. have secured the exclusive manufacture and sale of meets a want which has long been felt, and makes sure an economy which must result in the general adoption of Hovey's extinguisher.

The accompanying cuts (full size) represent the machine. It is attached to each post just above the ordinary stop-cock. The extinguisher can be set to any pressure, from $\frac{3}{4}$ to $2\frac{1}{2}$ inches, and by reducing the pressure on the mains to this point all the street lights will instantly go out, although not interfering in the least with the lights in the buildings. This pressure is regulated at the works, and when the street lamps are to be extinguished, the reduction of pressure to a given point (the work of a moment) results in extinguishing, instantaneously, every street lamp. The pressure can then be turned back to the maximum point without any escape of gas.

Difference of pressure, caused by different altitudes, is overcome by weighting each extinguisher to the required point, and in this way every street lamp is instantaneously put out by the same change of pressure at the works.

All interested can write or call upon the following parties, who have practically tested these extinguishers:

J. H. ROLLINS, Supt. of gas company at Worcester Mass. S. G. STINESS, Supt. of gas company at Pawtucket, R. I.

For sale at Fairbanks Scale Warehouses, 311 Broadway, New York, and at the principal warehouses—

Fairbanks & Co., New York; Baltimore, Md.; New Orleans; Buffalo, N. Y.; Albany, N. Y.; Montreal; London, Eng.

Fairbanks, Brown & Co., Boston, Mass.

Fairbanks & Ewing, Philadelphia, Pa.

Fairbanks, Morse & Co., Chicago, Ill.; Cincinnati, O.; Cleveland, O.; Pittsburgh, Pa.; Louisville, Ky.

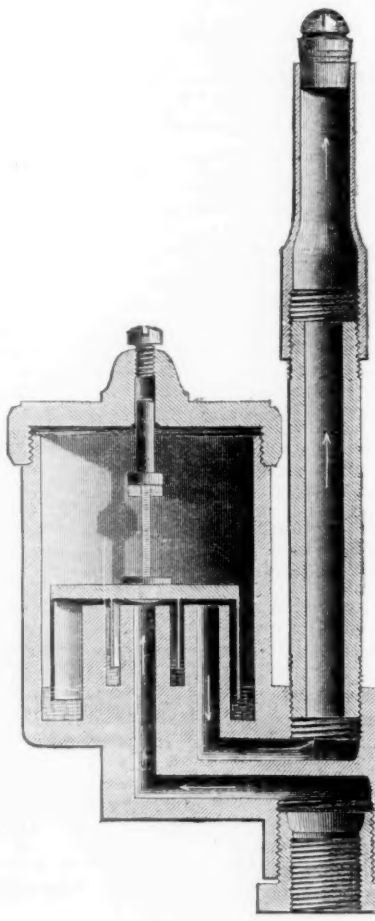

FIGURE 2.

Fairbanks & Co., St. Louis, Mo.

Fairbanks & Hutchinson, San Francisco, Cal.

Manufacturers, E. & T. Fairbanks & Co., St. Johnsbury, Vt.

COOLING HOT JOURNALS.—Von Heeren proposes a method of cooling hot journals by a mixture of sulphur and oil or grease. The fine metal dust formed when a journal runs hot, and which strongly acts upon both journal and bearing, forms a sulphide of sulphur. This compound, which grows soft and greasy, does not cause any appreciable amount of friction. It has been very successfully used by the steamers of the North German Lloyds.—*Iron Age.*

The Electric Arc Among the Gas Shares.

In Wednesday's *Daily News* we read as follows:

"Gas shares have been subjected to considerable depreciation owing to the publication of some statements stated to have been made at a meeting in Birmingham. The folly which shareholders exhibit in sacrificing their holdings on the slightest alarm cannot be too strongly deprecated." Among the changes recorded in the official list we find Imperial Continental fell 7; Gas-Light and Coke, H issue, 7½; ditto, Ordinary, 5, and so on, and so on.

There is little doubt that some excellent fooling (if fun were the writer's only object) on the part of the New York *Sun* is among the causes of this wonderful exhibition of alarm on the part of gas shareholders. But we doubt the fun. Any man quoting the remark that the sun shines on the evil and the good, would, if he combined candor with perfect knowledge, make an exception in favor of the New York *Sun*. It has a decided predilection for the evil. Nor is this all. Mr. Edison, besides being the most wonderful inventive genius of the age, is one of those rare beings, an American humorist. Indeed, if we are to believe the Western newspapers, those universities and stock raisers beyond Chicago who hastened, after the manner of our own Oxford, to enshrine his name on the rolls of their illustrious men and beasts, did so not because he had benefitted mankind or lived laborious days in his laboratory at Menlo Park, but because a word dropped by him had given rise to the rumor that he had just put the finishing-touch to a swearing-machine.

So much for the New York *Sun*. Although a student of science will have little difficulty in associating the results promised with the discovery of perpetual motion, it is quite probable that Mr. Edison has actually succeeded in doing what he states he has done in his telegram: "I have just solved the problem of the sub-division of the electric light indefinitely." What we wish to point out is that it is one thing to do this and another thing to produce an electric light for ordinary house and street use. Once put the molecules of solid carbon in motion, and just because a solid is in question, the light must be excessive and the expenditure of energy must be considerable.

While it is easy to believe that the future may produce a means of illumination midway between the electric light and gas, it is equally easy to see that the thing is impossible without great waste, and therefore cost, with dynamo-electric machines and carbon poles. So long as carbon is employed we shall have much light which, perhaps, can be increased and steadied if various gases and pressures are tried. But streets and rooms full of such suns as these would be unbearable unless we sacrifice much of the light after we have got it. Split up the current in the manner so cheerfully described by the New York paper, and the current will refuse to flow altogether if an engine of 5,000,000 horse-power be employed instead of the modest one of 500 which is to light the south part of the island. If Mr. Edison has succeeded in replacing carbon he may have turned the flank of the difficulty to a certain extent.

Although, however, we may pity the ignorance of those who act upon such statements as those made by the imaginative New York *Sun*, gas companies may well begin to feel uneasy at the general attention which is being drawn to the electric light as a substitute for gas *if they are prepared to let things alone*. That in one form or other it is likely to be partially adopted in all large cities and at extensive public works seems most likely. It will be one of the lights of the future, but not to the excluding or superseding of gas-light.

Our own columns have repeatedly borne testimony to the success which has attended its introduction into Paris, where it is to be met with at almost every corner, and at one or more of the railway stations. The general testimony of those who are unprejudiced is that at least for wide streets, squares, and open places, its lighting effect is all that could be desired. Every Londoner is familiar with the effect of the display which the enterprising Mr. Hollingshead has placed in front of the Gaiety Theatre, and the glowing contrast presented to the miserable yellow flames of the neighboring street lamps; but the contrast exists because the gas is bad and dear. Mr. Hollingshead, in a letter to the *Daily News*, corrects the view of the gas companies, that the electric light must necessarily cost more to produce than gas. His own display, necessarily wasteful, costs four-fifths what gas would, and he is probably correct when saying that with proper management it need not cost more than one-half. Moreover, in yesterday's *Times*, Mr. E. J. Reed refers to the case of M. E. Manchon, a large manufacturer at Rouen, who has gone to considerable expense to alter his premises to suit the electric light, and who, even with hired engine power, finds that there is an annual saving of 22·6 per cent. over gas, with infinitely better light and a wholesome atmosphere.

Mr. Reed is of opinion that even if the electric light cost more than gas, its advantages are so great, that for the lighting of public places, museums, art galleries, manufactories, etc., he would advocate its general introduction. Even Madrid one of the most backward cities in Europe, has introduced the light, one great benefit of which, especially in theatres and other much-frequented places, is that the heat generated and the contamination of the air is greatly less than in the case of gas.

Let the directors of gas companies do all they can to improve their gas. They may be certain that it will never cease to be required; a considerable splitting up of the electric current is impossible, while the brilliant light that we shall always get when electricity is employed will gradually so raise the pitch of illumination that more gas than ever will be used.—*Nature*, Thursday, Oct. 10.

Luminous and Chromatic Sensations.—Aug. Charpentier and Dr. Lanholt have found that the sensations of light and of color are the results of two entirely distinct functions, which, although they are intimately blended in the habitual use of the vision, may be clearly distinguished from each other by physiological analysis. By experiments with lenses they found that the sensibility of the eye to light was much greater when the eye is at rest in darkness than when it is in activity. There was, however, no such difference noticeable in the sensibility to color. Charpentier thinks that the explanation of this fact is to be found in the discovery by Boll and Rühne of a reddish chemical substance in the retina, which is discolored by light and which is renewed in darkness. If we admit, as seems probable, that the optic nerve is excited not directly by light, but indirectly by the chemical modification which the light produces in the retinal red, the superior sensibility of the eye in repose may be explained by the excess of the photo-chemical substance which the eye has acquired under the influence of darkness.—*Comptes Rendus.*

[Official Report.—Continued fonm page 205.]

SIXTH ANNUAL MEETING OF THE AMERICAN GAS-LIGHT ASSOCIATION.

HELD AT THE FIFTH AVE. HOTEL, N. Y., OCT. 16, 1878.

First Day—Afternoon Session.

Mr, Chambers (of Trenton, N. J.,) then read a paper, on the subject of "Water Gas," as follows:

On Water Gas.

The making of illuminating gas by the decomposition of water, with an admixture of petroleum or its products, is a subject that more than any other connected with their business, has claimed the attention of the managers of gas-light companies, for several years past.

It was a topic in existence at the time of the organization of this Association, and year by year came up at its meetings for discussion.

At the meeting in October, 1876, the Association, after a long debate, seeming to have become weary of the matter, abandoned its further consideration.

It may now, after the lapse of two years, be not amiss, briefly to consider the progress that has been made, and as far as possible judge what success has attended the efforts of those who are earnestly trying by this mode, to improve and cheapen artificial light.

And upon what in the material world can man more nobly expend his powers of mind and body, than in the production of light; that ethereal and subtle essence which, when "the earth was without form and void, and darkness was upon the face of the deep," burst forth upon chaos at the Almighty fiat, "Let there be Light." "And God saw the Light which he had made, and behold it was very good."

Not thus can man decree. A creature himself, he must be content when "the greater Light which rules the day" withdraws his shining, to dispel the darkness of the evening hours, with such light as he can extract from substances made ready to his hand by the Creator.

No wonder then that such mighty efforts are put forth to improve the modes of producing light by human skill.

Absence of light—is darkness; and we find in Holy Writ, that darkness was one of the plagues visited upon Pharoh and his people: "And there was a thick darkness in all the land of Egypt, three days; they saw not one another, neither rose any from his place, for three days."

With the origin, progress and present attainment of the coal gas manufacture, you are all familiar.

Let us now as briefly as possible review the past history of efforts in the manufacture of what we may call in a general way, Water Gas: and thus put ourselves in a position to understand the progress that has been made.

The first experiments in the making of Water Gas, were made in England about the year 1823.

In a report made to the Manhattan Gas-Light Company of the City of New York, in the year 1864, by Professor John Torrey, Carl Shultz and Henry Wurtz, is enumerated a list of sixty patents, for plans and devices of water gas apparatus, of various dates, during a period of thirty-six years, from 1823 to 1859.

Mr. Hughes, in his treatise on Gas Works—3rd edition—states, that about 1854, the hydrocarbon or water gas process was in great favor in Eng-

land, and very sanguine expectations existed of its success; and that among its supporters were the celebrated Dr. Frankland and Mr. Samuel Clegg.

Mr. Clegg's estimate was that 75,000 feet of 12 candle gas could be produced from one ton of Boghead coal, when submitted to water gas treatment.

The towns of Ruthin, Southport, Warminster and Dunkeld, were lighted with the gas, and a number of companies, among them the Manchester and South Metropolitan, made trials of the system on an extensive scale.

The results in all these cases failed to be satisfactory, and the operations were abandoned.

Among the numerous patented devices for producing water gas at that time, was one by a French chemist, M. Joseph Pierre Gillard. His invention is thus described by Mr. Hughes:

"With the view of obtaining hydrogen more economically, M. Gillard erected a cupola similar to those in iron foundries; this was filled with coke or charcoal, ignited, and the fuel brought to a state of incandescence by a fan or blower; after which (all passage to or from the atmosphere being closed), steam was admitted at the lower part, and passing through the volume of fuel, was decomposed, when the hydrogen and carbonic acid, with which it was impregnated, were withdrawn by an exhauster from the upper part of the cupola.

From time to time the supply of steam ceased, and air was furnished by the blower as before, to bring the fuel to the proper degree of temperature for the decomposition."

It is easy to recognize in this cupola, the present "Lowe" gas generator.

From 1834 to 1839, extensive experiments were made upon the continent of Europe with the process of M. Jobard.

The towns of Dijon, Strasburg and Antwerp, and two districts of Paris, were supplied with gas made under his patent.

It was claimed that by this process 55 cubic feet of highly brilliant gas could be produced from each pound of resinous or mineral oil, capable of yielding alone only 7 feet.

After five years of trial the plan failed.

In 1860 an effort was made to introduce the manufacture of water gas under the "Sanders process," into the Philadelphia gas works.

The carbonaceous material in this case was rosin.

The owners of this patent proposed to make this gas equal in every respect to the gas ordinarily made at the city gas works, at a cost of thirty cents per thousand feet. Experiments made at the gas works were not successful, The promoters of the process charged the chief engineer of the city works with obstructing its success, and a violent controversy arose, which was carried on through one of the newspapers for nearly three months.

At length a small works was built at one of the hotels, and a part of the building lighted with the gas.

A few extracts from the newspapers of that day will show the flattering estimate placed upon the gas.

From the *Phil. N. Am. and U. S. Gazette* of July 31st, 1860.

"*The Water Gas.—A Brilliant Light at the Girard House.*

"These lights were commenced three weeks ago. Some days elapsed before the tar produced by the coal gas was cleared out of the pipes; and now we have this wondrous discovery, the water gas, in all its glory, diffusing light and cheerfulness everywhere around.

Its influence extends far and wide, for the brightness is of a white, clear, pure and penetrating character, before which even distant darkness flies away.

One great advantage too, is its cheapness; the price being much less than that of the gas made from bituminous coal. The economy is derivable.

First. From the superior productive power of the retorts.

Second. From the decreased proportion of labor.

Third. From the decreased capital required in original construction.

Fourth. From the decreased cost of gas material.

A reduction of four-fifths in cost of material, transportation and labor, will doubtless secure its introduction to many regions now but partially supplied with this great agent of social progrees, enlightenment and comfort."

"From the *Public Ledger*.

"The quality of the gas appears to be good, giving a strong and brilliant light.

Those interested in its manufacture state that the actual cost of its manufacture, exclusive of labor, wear and tear of retorts, &c., will not exceed twenty-eight cents per thousand feet."

"From the *Evening Bulletin*.

"A more brilliant light than that seen every evening from the burners supplied from this source, could not be desired.

The proprietors of the Girard House are already satisfied that it costs much less than the gas furnished from the city works."

"From the *Press*.

"The peculiar merit is, pure light produced with a maximum of labor, and in this city at five-sixths of the cost of ordinary consumption."

Correspondence of the *New York Tribune*. "It has been demonstrated that this gas can be produced at forty cents per one thousand cubic feet."

Not withstanding the encomiums so freely bestowed upod the gas, it made no further progress in Philadelphia, and soon disappeared.

The files of the American Gas-Light Journal for the years 1861 and 1862, contain much discussion on the subject of water gas. Then for a few years not so much was heard about it, though new inventions were preparing to enter upon the scene. A new ally also was found in the natural oil from the wells of Pennsylvania, which, by affording cheap material for enriching the water gas, raised the expectations of inventors, and incited them to renew their efforts.

In 1874 several patented processes were brought to the notice of gas-light companies, and their merits urgently set forth. Prominent among those was the one known as the Lowe Process, and it is in regard to this process I now propose to give such facts as are in my knowledge.

At the outset, let me state what the process was claimed to be able to perform.

I can perhaps best do this by extracts from letters received from an agent.

"Presuming that you have an average daily consumption of 100,000 cubic feet at a cost of $1. the result would be $100.

By the Lowe Process it would be	$26.
Showing a daily saving of	74.
Or per week	444.

But this only shows the saving in the first cost of the gas. The subsequent saving in labor would be very great; I cannot even guess how much. Two men or well grown boys would be able to do all the work. By this process there is absolutely no residuum, no debris, no lime, no coal tar, no dust, no dirt, no drips—nothing, in short, but to make money quietly, pleasantly and acceptably to the public whom you serve."

"You could dispose of nine-tenths of your real estate, all of your retorts, &c., and divide twenty-five to fifty per cent. per annum."

Speaking of a works then in operation, the agent wrote: "The townspeople are delighted, the gas is magnificent, and applications to introduce it are thronging in, very much to the satisfaction of the company.

Reducing these enthusiastic and somewhat incoherent statements to a plain matter of fact standard, their claim is, that gas can be produced of as good quality, at a much less cost, and with a smaller outlay for works, by the mode proposed, than can be produced by the coal method in common use.

Let us now try to ascertain how far these expectations have been realized.

It is unnecessary for me to narrate the steps by which in December, 1877, the Trenton Gas-Light Company found itself the owner of a gas works built exclusively for the purpose of making this gas. This works was put into operation in December, 1876, and by the December following had obtained about 350 consumers.

The works and apparatus consisted of a generating house, 40×35 feet, containing one steam boiler and engine, two trains of apparatus, each consisting of a generator, superheater, wash-box and scrubber, a holder, street mains and consumer's meters, together with the necessary oil and coal storage.

The illuminating quality of the gas, though attended with some irregularity, has not been a matter of serious complaint. It is in the power of the gas maker to increase or diminish this quality of the gas by using more or less oil; and hence, by skill and care, a good illuminating power can be commonly maintained.

In two respects, however, the gas proved to be unsatisfactory to many of its consumers.

One was the stopping up of the tips of the burners with a pitchy, or a hard deposit, which rendered it necessary to frequently clean out or renew the burners.

In some instances the house pipes became clogged.

The other was its peculiar offensive odor.

For these reasons many of the consumers applied to be changed back to the coal gas, and from December, 1877, to July, 1878, 87 consumers were at their own request thus transferred. During the same period there were no new applications for the introduction of the water gas.

In view of this result, it must be conceded that this gas is not as acceptable to the consumer as gas from coal.

The only measurement of the gas from this works is by the consumers' meters. Hence, any calculation of its cost must be upon the amount of gas sold—the unaccounted for gas being an uncertain element in such cost.

For the quarter ending December 31, 1877, there was sold of this gas, 2,600,000 cubic feet.

There were used in making 14,930 gallons of oil, at 8½ cents ($1,269.05), 246,240 lbs. of coal, at 20 cents per hundred ($492.48); being for material	$1,761 53
There was paid for wages	591 50
Making total cost	$2,353 03

Being at the rate of 90·5 cents per 1,000 feet.
Or, for oil and coal.... 68·0 " "
For wages..... 22·5 " "

For the quarter ending March 31, 1878, there was sold, 1,592,000 cubic feet.

There was used in making 9,019 gallons of oil, at 8 cents ($721.52), 150,140 lbs. of coal, at 17 cents per hundred ($255.23); being for material.....	$976 75
There was paid for wages.....	533 50
Making total cost.....	$1,510 25

Being at the rate of 94·9 cents per 1,000 feet.
Or, for oil and coal... 61·4 " "
For wages..... 33·5 " "

The whole amount of gas sold from the starting of the works in December, 1876, to the 1st day of July, 1878, (being a period of a year and a half), was 9,704,000 cubic feet.

The amount paid for making was—

For oil.....	$4,701 25
For coal.....	1,665 05
Being for material.....	$6,366 30
And for wages.....	2,445 00
Making total cost.....	$8,811 30

Being at the rate of 90·8 cents per 1,000 feet.
Or, for oil and coal... 65·6 " "
For wages..... 25·2 " "

A further item of expense, which is peculiar to patent gas, must be added to this cost, for the royalty to be paid for the right to manufacture, or for the purchase of the patent.

These three statements are sufficiently near each other in proportions to show a good degree of regularity in working, and are submitted, not as good or bad in themselves, but as facts of practice.

Any gas manager, by taking the same data, can compare these results with his own, and judge whether the promise of much lower cost has been fulfilled.

The claim of smaller outlay for building works is hardly worthy of consideration.

The two sets of generating apparatus in the works under review have each a productive capacity of about 70,000 feet in 24 hours—being for the two, 140,000 feet in the same time. Upon about the same space could be built four benches of retorts, of modern construction, capable of producing an equal volume of gas.

Should purification be adopted, equivalent buildings in that department must be constructed.

In no other parts of a works could there be any comparatively less construction.

If the results of the experiment which have now been laid before you are fair, it must be acknowledged that coal gas still holds its place in the advance; and that water gas, after half a century of effort, has not yet overtaken it.

It is to be regretted that the skill of inventors has not been able to bring about results equal to their desires.

By none would a large reduction in the cost of making gas be hailed with greater pleasure than by the members of this Association.

It is the hope of improvement which brings us together, and makes this Association possible.

It is our product that chiefly concerns us, not the materia or means through which it is obtained.

It is the satisfaction of our customers and employers for which we strive, not the promotion of this or that process or invention.

The careful manager should be swayed neither on the one hand by prejudiced indifference, nor on the other by unreasoning zeal. While diligently seeking improvement, he should look with distrust on plans and schemes heralded forth with bragging boastfulness.

"Oft expectation fails; and most oft there where most is promised."

Let us, then, "Prove all things; hold fast that which is good."

Authorities quoted—

"A Treatise on Gas Works," by Samuel Hughes. Third ed., 1866.

"History and Value of Water Gas Processes," with appendix. By John Torrey, Carl Shultz, and Henry Wurtz. 1864.

"Report of the Philadelphia Gas Trust for 1861."

"The Water Gas Correspondence." Reprinted from the Philadelphia *North American* and *United States Gazette*. 1860.

O. T.; N. T.; Shakespeare.

Mr. Chambers also read several letters from consumers who were using the gas, complaining of the clogging of the pipes, the unpleasant odor emitted, etc., and asking to have coal gas substituted.

Mr. Neal—There were no residuals?

Mr. Chambers—No, sir; nothing of consequence—nothing that could be utilized. There are no means of making a photometric test of the gas at those works, and such a test has never been made. The main point to consider was whether it was satisfactory to the consumers. To all appearances the gas is about like coal gas, but it is liable to fluctuate, of course, as all gases of that kind would be, because they cannot regulate the amount of oil and the amount of steam to a nicety.

Mr. Price—Do you run the works?

Mr. Chambers—No, sir; we have not interfered with them at all. The same superintendent and the same men are there. All we did when we took possession of the works was to say to the superintendent, "Do the best you can." We furnished them everything they needed to carry on the work.

Mr. Price—Are you still running the works?

Mr. Chambers—Yes, sir. Since the paper I have read was written I have had an opprtunity afforded me of obtaining information on two or three points connected with the manufacture of this gas. A week ago to-day the superintendent of those works called upon me and told me that if I would step around with him I could see one of the difficulties which they had to encounter, in regard to the obstruction that took place in the pipe leading from the works to the holder. I found the pipe was all dug up, and they were scraping out the inlet pipe to the holder with their hoes, and were clearing out a quantity of tar, or matter of some kind, which was beginning to obstruct the pipe. The other point was that one of their super-heaters had failed to work, and upon taking out bricks from the inside it was found partially closed up with carbon. The point about that is this, that we do not, by this process escape the troubles that are incident to gas making from naphtha, from coal, and from other methods, but we find the very same troubles here. There is the stopping of the pipes, and the clogging up of these super-heaters with carbon. So we see it is not all plain sailing by this process, any more than it is by the ordinary process.

Mr. Pearson—I would like to inquire if the gas is purified?

Mr. Chambers—No, sir.

Mr. Pearson—Would not that obviate the difficulty of the obstruction of the pipes?

Mr. Chambers—The gas was not purified, as I have said.

Mr. Pearson—Did the gas go through any purification except the operation of the scrubbers?

Mr. Chambers—No, sir.

Mr. Pearson—With reference to what you have said in regard to this obstruction of the pipes, and of the burners—could it not be traced directly to the want of purification? Would not the same trouble occur with coal gas if it were sent to consumers without any purification beyond scrubbing? I am inclined to think there would be just as much trouble. I think it is a matter that deserves some attention at our hands, and while I am upon the subject I will say that I have made some investigations in regard to this method of gas making. I have visited the Lowe gas process works at Harrisburgh and Baltimore, and other points, with a view to ascertaining various facts in regard to the manufacture of gas by this process, and I have some data which I think will be of some interest to the members of this Association. I am not a Lowe gas process man, but I am seeking for light—for cheap light and for good light—and I presume that every one here is actuated by the same motive, and that we are all willing to discuss this question with a view to our profit and benefit, individually as well as representatives of gas companies.

Mr. Price—The hour of five o'clock has how arrived—the time fixed by resolution for adjournment—and I suppose the further discussion of this question had better be postponed until morning.

On motion of Mr. Neal, the Association adjourned until to-morrow morning, at 10 o'clock.

SECOND DAY.

The Association met at 10 A.M., in the Fifth Avenue Hall, and was called to order by the President, General Roome.

On motion of Mr. Neal, the reading of the minutes of yesterday's proceedings was dispensed with.

Sec. *pro tem.*—Before we proceed to the discussion of the paper, I would like to give notice, as a matter of form, that the Executive Committee have submitted an amendment to the Constitution. It requires no action on the part of the Association at this time; but our Constitution requires that notice shall be given of proposed amendments to the Constitution at one meeting, and that it shall be acted upon at the next. The amendment proposed is to Section II., and is as follows:

Insert, after the word committee, the following: "And that a change of at least one vice-president, one member of the finance committee and two members of the executive committee, be made at each annual meeting of the Association."

There have been presented, properly certified and endorsed, for membership, Mr. Henry Y. Attrill, Director in the New Orleans Gas-Light

Company, and also in the Laclede Gas-Light Company of St. Louis, Mo.; and Andrew A. Smalley, President of the Citizens Gas-Light Company, of Newark, N. J., and I move that they be elected in the usual form.

The motion was carried. The chair appointed Mr. Neal as teller.

The secretary *pro tem.* cast the ballot as directed. Mr. Neal reported the gentlemen named duly elected active members of the Association.

The President—There was a paper under discussion when we adjourned last evening—the paper read by Mr. Chambers, on the subject of "Water Gas."

Mr. Pearson—I am sorry that the discussion was not continued last evening, because there are some points in Mr. Chambers' paper, which, I fear, may have been forgotten. Before giving any of my experience, or the results of my investigations, I would like to ask Mr. Chambers a question or two, which, I suppose, he will have no objection to answer. I should like to know whether the cost per 1,000 feet of gas, which he stated to be 90 or 94 cents, was for the gas in the holder, or for gas sold?

Mr. Chambers—It was for gas sold.

Mr. Pearson—I should like also to know how the gas was measured; whether there was a station meter, or how the amount was arrived at?

Mr. Chambers—There was no station meter ever erected at those works; and, consequently, the only method of measurement was by the gas sold.

Mr. Pearson—Have you any idea of how much leakage there was?

Mr. Chambers—I have not; I don't think the leakage was very great; I believe the pipes were well laid, and that very little leakage took place.

Mr. Pearson—I should also like to know what the gas cost in the holder?

Mr. Chambers—I do not know, sir; I did not make any guesses as to any statement that I made here. I simply took the actual facts, from the practical operation of the works, as they were given me by the superintendent.

Mr. Pearson—Were those figures from the books of the old company, or from the books of the new company purchasing? What I want to know is whether these figures were the results of your own working?

Mr. Chambers—No, sir; the same superintendent has had charge of them all along. There has been no change in that respect since the company has passed into our hands. The superintendent keeps his own figures, and these figures, as I have stated, were given to me by him.

The two things are as distinct today as they were before we purchased.

Mr. Pearson—Who keeps the books of the old company?

Mr. Chambers—The books of the old company have been kept by the superintendent, as I have stated; the books of the new company are kept at their office.

Mr. Pearson—Did you not state, yesterday, that there was no purification of the gas?

Mr. Chambers—Yes, sir; I did. It was without purification. It was thought that purification was not necessary in that process.

Mr. Pearson—Then, I think, that sufficiently accounts for the trouble that was experienced by the consumers, because I found the very same thing to exist in Harrisburgh, where no purification was made; but, in other places, where they had proper purification, the same thing did not exist.

With the permission of the President, I should like to make a few statements in regard to this matter; and I will state, at the outset, that my attention has recently been particularly directed to the Lowe gas; and it is because we have made a conditional arrangement at Toronto, for its introduction, that I have asked these questions, and it is also partly on that account that I shall make the statements which I desire to make at this meeting.

About a year ago an effort was made to introduce the gas at Toronto, but we then declined entering into any negotiations with the parties making the proportions. We subsequently ascertained that, at Kingston, the gas had been in use, and one of our largest stockholders, the president of the Brockville Gas Company, made certain representations, in regard to the cheapness and quality of the gas, which induced our directors to send myself and the superintendent to Kingston. Before I went I was thoroughly prejudiced against the Lowe process, and I had no idea whatever that the statements which were made were correct; but after examination I consider I had good cause to change my opinion. One matter that we had directions particularly to inquire into was whether the evils which Mr. Chambers has referred to, existed there; and on our arrival at Kingston and prior to going to the gas works, the superintendent and myself went around amongst the consumers and inquired whether there was any trouble from the clogging of the pipes or burners. That was in September. They commenced making gas in January, so that eight or nine months had elapsed prior to our visit. In every instance where we made inquiries, we found that the consumers were better satisged with the gas made from the Lowe process than they were with the gas made by the old process. Perhaps the old gas was not very good; but I don't know anything about that. After having made these inquiries we went to the works. I would say, at this point, that the manager of the works is a man of a great deal of practical experience, and is entirely reliable. I think there are gentlemen present who can testify to that. He has been in the gas business between thirty and forty years, and is very cautious about introducing any new process. Mr. Kerr, the gentleman referred to, gave us access to his books, and I took the record from them. Not only did I do that; but, in the process of the manufacture of the gas, I saw the amount of material weighed and measured; and, therefore, I can speak from what I actually saw, as well as from the results obtained from the books.

The figures that I took from the books were for the months of June, July and August of last year. The price of the anthracite coal used was $5 per ton, and the price of crude petroleum was eight cents per gallon. The coal for the month of June cost 15 cents, petroleum 22 cents, and labor 19 cents—charging a whole day's labor for a man only partially employed—making a total of 56 cents per thousand feet, not including cost of purification. For July (I give the totals and not the details) it was 54 cents. For August it was 51 cents. The amount of coal used, including that used for the boiler, was, for the first month, 62 lbs. per thousand feet; for the second month, 58 lbs.: and for the third month, 54 lbs. The number of gallons of petroleum used for the first month was 2·73; for the second, 2·69; for the third, 2·61 per thousand, and the illuminating power of the gas, as tested by a Lowe jet photometer, averaged 16 candles.

The results of the other test referred to, when the coal and oil used were weighed and measured before us, and during the whole time it was being made we were present, were as follows: Cost of coal, 15 cents, petroleum, 21 cents, and labor (charging for the time the man was actually employed), eight cents. Total cost per thousand feet (not including purification) 44 cents.

In March last I wrote to Mr. Kerr, asking if he was still satisfied with the process, and whether he had discovered any defects in its working which he was not aware of at the time of our visit.

And as he is not here, which I regret, perhaps it may be well for me to read the letter, or portions of the letter, which is dated March 27th, which I received from him in reply, and this was after the works had been in operation for about 15 months. He says: "In reply to your questions, I say, first—I am still satisfied with the process, and have not found any special defects in its working. 2d. I have not experienced any stoppage or clogging up of pipes, and very few of the burners have been affected. Indeed, I think we have less trouble in this respect than when we made gas from coal. The reports which you have received to the contrary, must either arise from prejudice or ignorance of the proper working of the system. I have the same burners and taps in use in my photometric room that I had when you were here, and have never cleaned them; and for the last six months I have been passing the gas, to supply an experimental burner, through a glass tube, and, as yet, I cannot perceive the slightest trace of deposit of any kind whatever.

"I suppose you have also received exaggerated reports relative to its liability to condensation, and consequently its decreased illuminating power when passed from a warm to a cold temperature. During the last winter I made some experiments upon this point. I passed the gas from my photometer room, the temperature of which is generally between 65 and 70 degrees, to the yard outside, which reduces its temperature to several degrees below zero, and then through a series of pipes, in all about 50 feet, and finally brought it back to the photometer; and the difference of the illuminating power before it went out and when it came back was very small indeed, and on several occasions it remained in the pipes and exposed to the weather for a week at a time."

I visited Kingston again in August last, and asked him whether he was still of the same opinion that he was when he wrote that letter, and he told me that, if anything, he was better pleased with the gas than it was at first. This is the testimony of a highly respectable gentlemen, and a man of long practical experience in gas making. Our directors, however, were not willing to introduce the process solely upon the reports received from Kingston, and I was therefore deputed, with our superintendent, to go to Baltimore. Our visit there, I will say, was unexpected, but we were allowed to go through the works and examine them. I make a record of what I saw, and the statement I am about to make was taken from the books of the company, and not from actual observation, because, as a number of the generators were working continuously, and were charged at different times, it was impossibln to get an accurate statement of the amount of naphtha and coal used without referring to the books. I shall refer, with the permission of the Association, to a copy of a report which we made to our board of directors upon our return, containing the record

I made, which covers a period of about six weeks. The record shows that it took 47·60 pounds, (say 50) of anthracite coal, at $3.50 per net ton, and 4·58 (say 4½) gallons of crude naphtha, at 4½ cents per gallon, to produce 1,000 cubic feet of gas. Seven men were employed on each shift, or 14 per diem, whose wages averaged $2 each. These men, we were informed, were quite sufficient to work eight sets of apparatus, capable easily of producing 600,000 feet per diem. This would make the gas cost as follows:

Labor per 600,000 feet..	$28 00	
Per 1,000 feet.....	4·64	cents.
Naphtha, 4½ gallons at 4½ cents.	20·25	"
Coal, 50 pounds, at $3.50 per ton, including fuel for boiler..	8·75	"
Total cost.....	33·64	cents.

This is the gas not including purification, and I have no reason to suppose it to be otherwise than correct. We, with the engineer of the works, tested the illuminating power of the gas with Bunsen's bar photometer, and the average illuminating power, after corrections, was 22·31 candles. The engineer assured us that they kept the gas constantly at about that standard; and this I have no reason to doubt; as I have said before, our visit was unexpected. On testing the gas we found it free from ammonia and carbonic acid, but the test-paper showed a slight trace of sulphuretted hydrogen. On inquiring among the consumers, we found they were well satisfied with the gas, and in no case had the pipes or burners been stopped up from use.

We went from these to Harrisburgh, Pa., and we learned the reason why the gas had not been successful there. I do not want to say anything against the conduct of the works, but I will simply state that the means of ascertaining the quantity of material used were not very complete.

There were two generators and super-heaters, with wash-boxes and condensers, *but no purifiers*, and consequently the gas was impure, and showed, on testing, the presence of a very large quantity of sulphuretted hydrogen. There was no station meter, governor, or photometer, nor was the coal and oil used weighed or measured. The holder was only of 35,000 capacity, being much too small for the quantity of gas manufactured. We were informed by the superintendent that they used 4 1-10 gallons of naphtha and 65 lbs. of coal per 1,000 feet, and employed one foreman and three men. The gas being without purification, and being produced under these circumstances, I do not wonder that the people did not want to use it. I am sure I should have been very reluctant to do so, as I would coal gas without purification. Proper purification would have remedied the whole difficulty; and I can only wonder that, with so effective a remedy within their reach, the company did not employ it.

As I have stated, we have made additional arrangements with S. A. Stevens & Co. to introduce the gas in Toronto. They seem, at all events, to be very sincere in what they are doing. They have agreed to erect works themselves in Toronto, upon these conditions: that they shall produce 1,000 feet of gas from 4 gallons of petroleum and 60 pounds of ordinary anthracite coal, or 50 pounds of Indian Ridge coal, and that if we cannot, on an average throughout the year, produce that amount of gas from that quantity of material, they will take their works down at their own expense, and not require anything from us whatever. They have so much confidence, evidently, in their own system, that they are willing to introduce the gas in Toronto upon those terms.

Now let us see what it will cost with the present price of coal, and material, and labor in Toronto. So far as my information goes, it is just a question of cost. If soft coal is very cheap, say about $2.50 per ton, and if crude petroleum is from 8 to 10 cents per gallon, then, of course, it is more profitable to use bituminous coal, and make gas by the old system; but if oil and hard coal are relatively cheaper, then it is more profitable to make gas by the new process. At least, these are my views. I am willing, of course, to be corrected if I am wrong. Now, as to the question of cost at present prices:

Coal at, say, $5 per ton, would cost, per 1,000 feet.....	15·00	cents.
Oil, at 5 cents, would cost.....	20·00	"
Purification	02·00	"
Labor.....	04·64	"
Total cost per 1,000 feet.....	41·64	cents.

Now, the gentlemen here will know whether they can make gas from coal as cheaply as that or not. Perhaps some of them can, but I will frankly confess that we cannot do so. And if we find that with the present price of material we can make gas as cheaply as the amount I have stated, by the Lowe process, it will pay us to introduce it. Besides, we have this advantage: we have our coal works, and if we do not succeed in making the gas upon the conditions named, we can go back to the old process again.

Another point is this: I am informed that coke can be used in the generators instead of hard coal. I have been told that this has been done successfully at Indianapolis. If so, the cost of the gas can be lessened very materially, and coke, which cannot be sold, used profitably. We want to get the best gas, and at the same time the cheapest gas we can; and we are quite willing, in Toronto, to take the Lowe process on the terms at which it has been offered to us. It may be that at the end of the year our expectations will not be realized, but, at any rate, we shall gain experience, and cannot lose much. If I should be present at the next meeting of the Association, I will as frankly give you my experience of the process then as I have now given you the results of my examination in this direction, which have lead me to form the conclusions I have arrived at. [Applause.]

Mr. Chambers—I hope Mr. Pearson's pleasurable expectations may be realized. I am sure no one would be better pleased than myself to know how to manufacture this gas profitably, and do away with the complaints of consumers. We have purchased this plant at Trenton at a great cost, and if it should result that gas can be made cheaper and better by the Lowe process, than by the old, I am sure we shall be very glad, because we have the appliances for the manufacture of this gas at our command. It was not my intention, in the paper I prepared, to make any statements in regard to the scientific analysis of the gas, the results of photometric observations, or any thing of that kind; but merely to give practical results.

Mr. Edgerton—I did not happen to be here yesterday when the paper was read by Mr. Chambers. In fact, I had understood there would be no further discussion of naphtha gas, and for that reason it was not my intention to attend the meetings of the Association; but hearing that a paper had been read stating results that were unfavorable to that process of making gas, I determined to enter into the discussion, and give a few facts. The points I desire to make in regard to naphtha gas are confined to facts and results entirely outside of the works. I do not wish, with but one exception, to make the slightest reference to any information to be obtained inside the gas works. What I have to say about the cost of production of naphtha gas can be demonstrated by that which can be learned outside the works; and the reason, I briefly state, is this—that if oil is passed through a red-hot retort, it is decomposed into two classes of gas: illuminating gas and non-illuminating gas. I have found by numerous tests that the percentage of illuminating gas is a fair indication—in fact, a more exact indication—than can be had in any other manner of the amount of oil used. Upon this basis I have made, since I have been in the city, quite a number of observations of the methods of making gas here from oil, and I will give you the result.

In the first place, I have made examinations and inquiries concerning the composition of a gas known as the "Tessie du Motay gas." I do not know why that name is given it, but it is manufactured at the works of the Municipal Gas Company. I found this gas contained 14·42 per cent. of illuminating gas, and of carbonic-oxide, 28 per cent. These figures, if proven, will be a pretty fair estimate of the value. Previous tests with water gas assured me that the carbonic oxide was in the proportion of 39·9 per cent. From that I considered the ratio of water gas to oil gas to be that of 28 to 39·9, and the balance of the gas to be the result of naphtha decomposition. Carrying these figures out, I found the composition of the gas, as delivered to the consumer, was 70·2 per cent. of water gas, and 29·8 per cent. of naphtha gases. For the reasons given, the source of these two gases cannot be any other than that stated, viz., that the 70·2 per cent. must be the result of the decomposition of water, and the 29·8 per cent. must result from the decomposition of oil. Of this 29·8, the illuminating gases must necessarily be a part. They cannot come from water gas, for we know that it has no illuminating power whatever. Deducting the illuminant, 14·42 per cent., as above stated, from the total of the naphtha gases, 29·8 per cent., it leaves the non-illuminating product of naphtha decomposition 15·4 per cent.

Numerous tests and experiments have shown the total product from the decomposition of a gallon of naphtha to be from 70 to 80 cubic feet of gas.

As the proportion of naphtha gas found in Municipal gas was 29·8 per cent. of the whole, it follows that one thousand cubic feet of such gas consists of 298 cubic feet of naphtha gas, and the balance, 702 cubic feet, of water gas. The naphtha gas portion being yielded at the rate of 70 to 80 cubic feet per gallon, it would require from four to four and a-half gallons of naphtha per thousand. This gives, in my opinion, a basis to calculate upon, independent of any information derived at the works.

Now, the value of the gas is of the greatest importance because, in estimating the value of any product, it must be based upon the illuminating value of that product. On this point there is great difference of opinion. Most of the results and tests of naphtha gas in this country have been from Argand burners; but that is not a true test of rich gas. It is so tested in London by the Gas Referees. The system of testing in vogue here is not a true one, as I can show you.

I found the illuminating value of the Municipal gas, as tested with a flat flame burner, set at an angle of forty-five degrees, with the bar, to be as follows:

TESTS OF MUNICIPAL GAS.

Pressure at point of Ignition.	Rate of Gas Consumption per Hour.	Observed Candle Power.	Candle Power per Cubic Foot.	Proportional candle power five cu. feet.	Remarks.
2-10	2.06	10.060	4.885	24.425	45° Angle with Bar. Four feet Excavated Lava Tip. September 28th. (1)
3-10	2.59	13.955	5.388	26.940	
4-10	3.28	17.800	5.427	27.135	
5-10	3.78	20.353	5.384	26.922	
6-10	4.29	23.132	5.392	26.960	
7-10	4.71	23.952	5.085	25.427	
3-10	3.70	20.080	5.427	27.135	Five foot Excavated Lava Tip, Sept. 28th. (2)
4-10	4.52	24.780	5.482	27.412	
5-10	5.15	28.350	5.505	27.525	
4-10	4.52	25.590	5.662	28.310	Flat of Flame to Disc. (3)
2-10	3.23	17.530	5.427	27.135	Six foot Excavated Tip. 45° to Bar. (2)
3-10	4.20	23.270	5.541	27.705	
4-10	5.10	28.300	5.560	27.800	
5-10	5.86	32.570	5.558	27.790	
6-10	6.50	35.320	5.434	27.170	
3-10	1.34	5.250	3.918	19.590	Three foot Lava Fishtail. (3)
4-10	1.58	6.262	3.963	19.815	
5-10	1.83	7.249	3.961	19.805	
6-10	2.04	7.490	3.671	18.355	
2-10	1.58	7.024	4.446	22.230	Four foot Lava Fishtail. (3)
3-10	1.97	8.959	4.548	22.740	
4-10	2.28	10.550	4.627	23.135	
5-10	2.60	11.840	4.554	22.770	
6-10	2.93	13.133	4.482	22.412	
2-10	1.54	7.366	4.783	23.915	5 foot Fishtail, Lava Tip. (3)
3-10	2.01	9.858	4.905	24.525	
3-10	3.762	9.811	2.608	13.040	New York Gas Company's Gas, Sept. 28th, 3 to 5 P. M. 5 foot excavated Lava Tip bat's wing. Test made at 2 miles distance from works. (4)
4-10	5.062	13.103	2.588	12.940	
5-10	5.825	15.650	2.687	13.435	
6-10	6.912	18.074	2.612	13.060	
7-10	7.662	19.660	2.566	12.830	
8-10	8.312	20.920	2.517	12.585	

1 Illuminating Power Meter, 22.750.

2 The same gas, by Illuminating Power Meter, gave (1st series) mean of three tests, 23.160: Second series, three tests, 23.100.

3 Illuminating Power Meter, at beginning, 23.62; Illuminating Power Meter, at end, 24.75.

4 Illuminating Power Meter, 17.83.

Sugg Argand, "G." Burner.—Gas rate, 4.95; Candle rate, grains, 120.6; Observed candle power, 22.860; Reduced candle power, 23.210.

New York Examiner's Burner and Method of Observing.—18 C. Sugg-Letheby, Sept. 28th, 1878.—Gas rate, 4.31; Candle rate, grains, 119.7; Observed candle power, 15.96; Reduced candle power, 18.47

It will thus be seen that the indications of the illuminating power meter are higher than the fishtail and bat's-wing on poor gas, and lower with rich gas. This is also the view of Mr. Sugg, only he does not state the amount of difference.

Mr. C. White—Was the gas tested with an argand burner, or with a common burner?

Mr. Edgerton—It was tested with a flat flame burner.

Mr. White—Were both gases tested with the same burner?

Mr Edgerton—Both kinds were tested with the same burner.

But by the method of testing in vogue in New York I find that the same gas, of the Municipal company, would be stated at 17 candles; so then, it will be observed, the commercial value of the gas is stated to be nearly nine candles less for five cubic feet. This arises from the fact that the method in vogue for testing is without precedent. It is not used anywhere in the world except in New York.

Mr. Farmer has conceived a very good means of making comparisons readily—that is, as stated in candle feet—the amount of the product and the actual value of the product.

I will here state that I have been requested not to bring up this subject of Municipal gas. I shall, of course, discuss it so far as I shall deem it proper. I shall state nothing that I do not find outside the works. I do not come here to state what I find inside the works. I suppose the subject of naphtha and water gases is now under discussion, and whatever may be of use to the Association in that connection I consider myself at liberty to state. As I have said, the tests ware all made with a flat flame burner, set at an angle of forty-five degrees with the bar. I consider that to be the fair way.

The London Gas Referees have adopted a method of using a flat flame to the disc. That magnifies the quality of rich gases slightly, and is not, therefore, the proper way. Hence, in considering this question of naphtha gas, you must take into consideration the fact that the commercial value of the product, as we find it, is double that of coal gases. I think that can be demonstrated beyond question.

Mr. White—At what price is the gas sold in this city?

Mr. Edgerton—I think they all charge a uniform rate for the gas per thousand. I have been informed that it was $2.25; but I have never paid a gas bill, and cannot speak from positive knowledge. I have heard the rate stated at $2.50 and $2.25. I believe that is all I have to say in regard to the question.

Mr. Helme—To ordinary mortals this question of naphtha and petroleum gas is a very perplexing one. It has occupied the attention of this Association, more or less, at every meeting for several years. We have heard the statement of Mr. Pearson. It was very straightforward, and looked as if it were honestly and fairly made; and I have no doubt he believes it. Every part of it may be true for aught I know; but there is one thing I would like to say, by way of reply, to some of the matters he has spoken of. He tells us he has been dealing with S. A. Stevens & Co., and speaks of the contract he has made with them.

Mr. Neal—Will the gentleman please suspend his remarks for a moment?

The President I have the honor of introducing to you, gentlemen, Mr. W. W. Greenough, of Boston, who has been elected an honorary member of this Association.

In the name of this Association, Sir, I greet you with a hearty welcome.

Mr. Greenough—Gentlemen of the Association: I have but one word to say, and that is, that I am very greatly obliged for the honor you have conferred upon me in electing me an honorary member of this Association. Applause.

Mr. Helme—Mr. Pearson stated that S. A. Stevens & Co. have made a proposition to him, which he thinks is satisfactory, and it does look to be exceedingly fair; but in the city of Philadelphia, where S. A. Stevens & Co. live, where they have started their business, and have carried it on to the present time, they had an apparatus in operation, with purifiers and station meters, and everything that they have about gas-works, and everything they could desire to make their enterprise a success. They ran it for eighteen months, or two years, in a portion of Philadelphia, and the citizens of that part of the town grumbled very much, and said it was not the thing they wanted at all. Finally, the authorities had to order them to take it away. They put it up there on the same terms that they proposed to put it up at Mr. Pearson's works.

Before I took charge of the works with which I am at present connected, they were making gas from rosin, and when I went into the business I found the same state of affairs existing, in regard to the warfare against coal gas, that exists today, and, I believe, will exist as long as any of us live.

In my rambles during the past summer I came across a certain town where I found that the entire stock and works, which were designed to be run under the new process, belonged to two gentlemen, who had entire control, or were owners of the patents for that part of the country; and, to my surprise, they were not using this process at all. I asked them why they did not make gas by that method, when petroleum was selling up there at 98 cents a barrel. They said they would have to pay very little more than that, but that they didn't choose to use that process; but why they did not I don't know. They are gentlemen of means, and are making coal gas right straight along, with five retorts to the bench, and are

making some money. It all amounts to this that if they could make more money by using the patents they control they would do so. From the fact that they are not using them, it is to be presumed that they are satisfied they can make more money by manufacturing gas by the old method; so that, notwithstanding the cheapness of petroleum, and the introduction of the electric light, I don't believe there is any business that is much better than making gas from coal.

Mr. Neal—While the subject of water gas is before us, I wish to say that the desire has been expressed by several of the gentlemen present to visit the works of the Municipal Gas Company of this city. I have spoken to the Superintendent of these works, and he assures me that he will be happy to receive the members, at any time they may fix, either as individuals or as a body.

A member—I have been informed that Mr. Fish has had some experience with this Lowe process; and think the Association would be glad to hear from him.

Mr. Fish—While I am perfectly willing to give to the Association the benefit of any experience I may have upon this subject, I am perhaps not very well qualified to speak of results in the way of practical gas making, for the reason that, while I have been connected with the gas business for some time, I am the commercial manager of our company, and not the one who has charge of the practical details of the business. My son, who is the engineer of the Utica Gas-Light Company, was expected here until last night; and nothing was further from my expectations than to be called upon to make any statements at this meeting. I am not prepared to answer the gentleman who has asked for the information, except in a general way.

The Lowe gas process, which has occupied the attention of the Association for the last half hour, was in use at Utica for something like ten or eleven months. It was introduced there by Mr. Lowe himself. Mr. Lowe made a conspicuous failure with his first essays there at manufacturing gas from petroleum. He proved himself to be entirely ignorant on the subject and abandoned it. The gentlemen who had furnished the capital for Mr. Lowe's experiments, asked my son for further time to develop the merits of the process. The time in which he had stipulated to demonstrate what he could do having expired, and we being crowded for room, we had to remove it: but we gave those gentlemen who, in good faith, had advanced their money, a year longer to make further experiments, as it was supposed that there was merit in the process, and that if economy and good management could be secured in its operation, the practicability of manufacturing gas from petroleum could be demonstrated. They put up temporary wooden buildings, very imperfect in their character, for they were feeling their way, so to speak. They experimented for nearly a year, and, finally, got it to such a degree of perfection that we felt warranted in putting out our fires: and we did supply our town exclusively, for about ten months, with what is called petroleum gas, under the Lowe process.

Having been absent for a year or more, and having but recently returned, and the matter having gone very much out of my mind, I cannot attempt to state what the cost of the gas was; but it was considerably less than the expense we had incurred by the old method. We furnished our town with the gas for a period of about 10 months, when the wooden structure took fire and was consumed. We then immediately went back to the old process, and we are now furnishing our consumers with that gas. At the last semi-annual meeting of our board of directors, there was a resolution passed authorizing our engineer to put up two generators, by this method, at his leisure, and they are in process of construction.

There are a good many considerations to be taken into account in a plant situated as ours is when we determined the adoption of one course or the other. Practically, there were a great many difficulties with us in its introduction. There was great obstruction of the burners. There was a lack of supply in the first stages, for a month or two; but, one after another, these difficulties were overcome, and the result of the ten months, as I have stated, was a very considerable saving over the old method. I cannot state positively, but I think the cost was 54 cents per thousand feet, including labor and material necessary for production, in the holder. There was, I believe, an economy over the old method of between 80 and 90 cents. We are between wind and water, so to speak. We are between the supplies from tide-water, and from the west, and our coal costs us perhaps one dollar more than it would if we were on tide water. These matters of detail, however, I am not sufficiently familiar with to be able to state definitely the facts and figures which would be of interest to the Association. As I have stated I am not an engineer. I have been for many years the commercial manager of our company, and I am not prepared to go into particulars in discussing questions of relative value, and the details which belong to the engineer's department.

Mr. Helme—It has occurred to me that perhaps this Lowe process has hardly had a fair showing. It has been rumored that they are about to put up some coal benches in the new works at Baltimore, which looks as if they expected to abandon it. In explanation of that one of the gentlemen who is largely interested told me the other day that it was not owing to any want of faith in the success of the Lowe process, but that it was owing to a difficulty existing between Mr. Lowe and themselves, in regard to the royalty, the company supposing that they had secured the royalty by assignment, which Mr. Lowe and Mr. Stevens, I believe, dispute; and in order to put the matter in the position of a civil suit, an injunction was served upon them, and they determined to put up coal benches. I think it is nothing more than right and just that this question should be fairly treated, and that both sides should be considered.

On motion of Mr. Harbison, the thanks of the Association were tendered to Mr. Chambers for the paper read by him.

The President—The next thing in order is a paper, by Mr. Charles H. Nettleton, on the subject of "Selling Gas."

Mr. Nettleton—A little over a week ago the secretary informed me that there would be few papers presented at this meeting, and asked me if I could not prepare a paper of some sort; and the paper I am about to read is the outcome of that request. The style perhaps is not so good as it might have been had I had more time in which to prepare the paper; but the ideas are about those I wish to express.

Mr. Nettleton then read the following paper on the subject of

Selling Gas.

In this paper which I propose to present I have departed somewhat from the usual course taken in the selection of subjects. I think all the papers which have been read before the Association have treated, in one form or another, of the manufacture of gas; and it is fitting and proper that it should be so, as we are an Association of gas engineers. But most of those present occupy also the position of managers, and to them, in that capacity, I would particularly address myself in this paper on the selling of gas.

Before proceeding with my subject I desire to state that the views advanced in this paper are the conclusions arrived at by personal management of a small works in New England, and are not mere theories, having no local habitation except in the brain of the writer. That they do not apply to large, or even medium sized works, I am confident, but of their application in the working of a small works there is not the slightest doubt in my own mind.

I believe it is an admitted fact that gas companies, of all concerns dealing with the general public, are the most cordially disliked. The reasons we assign for this are almost too well known to be repeated here. The inherent nature of the business, dealing with a commodity which has to be measured in a blind way, and which is not readily understood by a jealous public, make our business a very difficult one in which to satisfy our customers. This we state broadly and repeatedly, and this, I think, most of us believe. But are we not deceiving ourselves when we say this? Is it not possible that we are ourselves to blame, in some measure, at least, for the distrust with which we are regarded, and for the dislike that many have for us? The mere witicisms that are so common—"You lie like a gas meter," "Don't ask that brother to pray, because he is the president of a gas company," and the like, to me show a state of feeling in the public mind for which we are largely to blame.

I am firmly convinced that the course pursued in selling gas, as it is generally practiced, is radically wrong. If we gave the same time and thought to that which we give to the manufacturing of our gas, I believe where pennies are saved now dollars, almost, could be saved then. In treating of the selling of gas, I would divide it into three parts: The means adopted to obtain new consumers; the treatment of them when obtained; and the introduction of appliances for the use of gas other than for illumination.

First, as to the means adopted to obtain new consumers. I hold it to be the duty of every gas manager to look for new customers as earnestly as he tries to reduce his leakage or increase his yield. A list of persons on the line of pipes who can afford to use gas, and who do not, should be prepared, and, if a possible thing, seen by the manager himself and asked to become consumers. With some, a very slight urging will bring the desired result, with others the change can only be brought about by repeated and repeated visits. Often a man will hesitate because of the expense of piping his building; and this is not to be wondered at, when it is considered that in having such work done he has to employ a set of men whose name is almost synonymous with excessive charges and big bills. In that case the manager should name him a price at once, to include service, setting meter, and piping, and, if necessary to obtain the customer, do the work ten, fifteen, or twenty dollars less than cost. I know of no better way to invest either of those sums, if by so doing I can add one to the list of of my consumers. It may be said such a course would make the service account a source of great expense. But would not great benefit be derived? What company could not afford to spend $1,000 or $2,000 for 100 consumers? The money would be back in the treasury in one or two years, and from that time the company would have the benefit of the extra consumption.

I have heard of a town in Michigan where the gas

company runs the service and pipes into buildings at its own expense, and then furnishes fixtures at cost. I commend the action of that company to your careful consideration.

Again, where a consumer has left you and put up lamps, unless he be a poor, miserable fellow, it is good magagement to make repeated attempts to bring him back. Personally, I am never tired of asking those who have left me to come back to the true faith. But to do this successfully you must not let your consumer leave you at the end of a quarrel. By a little patience and perseverance you can almost always induce a customer in leaving to make some remark like this—that he is "sorry to give up the use of gas but he cannot afford it." That leaves the matter at a point where you can see him again on the slightest pretext, and ask him to use gas once more.

I hold that in doing this neither you nor the company you represent lose your dignity in the least. I regard the selling of gas like the sale of any other commodity. We make it and have it for sale, and if the people will not come to us and buy, is it not best to go to them and sell?

Less than two years ago the engineer of a large company in a city not a thousand miles from here, where the loss of consumers had been very great, made this remark to me, "There is a large number of people in our city who are anxious to give up oil and use gas again, and are only waiting to be asked; but we shall never ask them to come back. If they ever use gas again they must do so of their own free will."

Supposing any of the merchants of this city attempted to do their business on similar plans, how long a time could they keep their doors open? Or how long a time would a traveling agent retain his position if he, in selling, merely went to a city, sent out his cards, and waited for customers to call on him?

I am positive, gentlemen, that we make a mistake in doing a little or nothing to gain new consumers, or regain those we have lost. It is our good fortune that in ordinary time the number will increase without our aid; but how much faster would it increase if we only put the same push and energy into our business that others are obliged to put into theirs in order to live!

As to the treatment of consumers when obtained. A gas manager should always be polite in meeting his consumers, and never, no matter how great the provocation, lose his temper. Never too tired to explain how the bills in September are naturally larger than in August, or those in October larger than in September. Never in so much of a hurry but that he can show how a meter works, and never so impatient that he cannot listen to every complaint, and never so busy that he cannot attend to all the wants of his customers.

He naturally meets them oftener when the bills are paid than at any other time. Do not receive the money as if it was conferring a favor on them to take it, but as if you knew it was a favor to your company that they paid it. A kind and pleasant word spoken then will often smooth away a frown, and your consumer, very likely, will go out of the office thinking the gas company is not such a bad institution after all.

But a man comes in bristling all over, and accuses you of selling poor gas, with oaths and adjectives thrown in not complimentary to your company. The impulse with every one is to resent it; but what good will that do? If the accusation be true, own it up; explain how it happened, and your consumer is disarmed. If it be false, convince the man of his error, and not let it pass as trivial. Show a man once that he is mistaken, and he will be chary about saying impudent or impolite things a second time.

Again, a customer tells you that he knows his meter is wrong, that all meters lie, and his is the worst of a bad lot. First, tell him his meter may be wrong—that it shall be tested—and invite him to be present when it is done; and then convince him of his error in regard to meters in general. Show him your glass meter, explain its workings, and my experience is you will never hear from that man again.

I have seen on the walls of a gas company's office, in a neighboring city, a lithograph of a man being carried away on a stretcher, and labeled "The man who was talked to death." It was the habit of the office, as the clerk informed me, when a consumer commenced to scold about his bill, to point to that picture and say nothing. Gentlemen, supposing the case to be reversed, and you or I to be treated in such a manner, would we feel kindly toward that company? In my own case, much as I like gas, it would be sufficient to make me use oil.

Again, I believe it to be poor policy to tell a customer, "Pay your bill, or I will take your meter out," and then perhaps remove it, as I have heard of some companies doing, in the evening, or so late in the afternoon that the man had no opportunity of purchasing lamps. If you have decided that the man is no longer to be trusted, and that his supply of gas must be stopped, go and have a talk with him, and ask him if he had not better quit for his own sake, and if possible get him to agree to that. Then allow him to name his own time, within a day or two, when he will be ready with lamps. The man then feels he has been liberally dealt with, and often will make special efforts to pay his bill; or, if he uses oil, he tells his friends and neighbors that he can not afford to use gas, and not that that "blank gas company" took out the meter.

Again, I believe it pays to be exceedingly liberal in collections. We all sell gas to a large number of poor men—men who really cannot afford to use it—and they often would consider it a great favor if a bill could go over for a month or two. Such concessions cost the company very little, and are of great moment to the persons to whom they are granted. Often, too, by being liberal in such a matter, a consumer will be retained who would otherwise be lost. A risk is run, to be sure, of losing the bill, and with it one or two more. But I am satisfied, after trying the experiment for several years, that I have made more than I have lost by it.

To sum all up. In dealing with your consumers, be reasonable, conciliatory, and generous.

Again, I believe the consumption can be largely increased by well directed efforts to have the gas used for other purposes than lighting. Most of us, I think, do favor gas stoves for cooking, and try to introduce them. I presume your experience has been similar to my own—that it is very difficult to sell the stove outright, owing to the expense. I worked on that plan for two or three years, and met with only partial success. During the past summer I offered to give the use of such stoves as I had free, if persons would use them for cooking. It was not long before all were out, and it is one of the best investments my company has ever made. I expect to continue to send out stoves, either in this way or for a mere nominal rent.

In this connection I would call your attention to the introduction of gas in factories or shops, where a small amount of heat is required, such as in soldering, heating glue, metals, and the like. Often the manufacturer has never thought of using gas for this purpose, or, if he has, he does not know how to accomplish it, or he dreads the cost, or puts it off for more weighty matters. More than once I have had manufacturers in my town, who have tried the gas for some of these purposes at my request, thank me for having called their attention to it.

Merely to show what can be accomplished in this line, and for no other reason, I will state that in three factories which I supply, there are in use fourteen stoves for soldering, and these will consume 250,000 feet in a year. All were put in at my solicitation, and but for that I am confident my company would have gone without that consumption for years—perhaps never had it.

Again, by strong efforts I believe gas engines may be introduced. At all events, in my small town I have one running, a second erected, which will be running in two weeks, and very fair prospects of selling a third. Their advantages over steam in being a perfectly steady power up to the limit of their capacity, in freedom from all care and attention, with no danger of an explosion, ought to enable us all to bring them to the favorable attention of manufacturers for small powers. Their principal disadvantage is their cost, and I sincerely trust that the gentlemen who control their manufacture and sale in this country can be induced to lower the price, so that it will bear favorable comparison with the prices of steam engines.

Probably some of you may think my ideas visionary, vague, and impracticable. To answer this charge, if it be in your minds, and before it is uttered, I will give a few facts relating to my consumption. During the past two years, when I have been putting forth my strongest efforts in the ways I have indicated, my consumption has increased rapidly. In 1877 it exceeded that of 1876 by 32 per cent., and this year I think it will be 25 per cent. larger than last; and to this might be added the fact that electric lights have taken away almost 5 per cent. of the whole. A portion of this increase is due, I am satisfied, to the endeavors I have put forth to extend the use of gas.

Given a small town, where it is possible for the manager to know personally almost every consumer, and let a plan similar to the one I have indicated be carried out, I feel confident that the use of gas will be largely extended; that when once obtained the consumers would remain; that the bad feeling, if it exists at all, would almost entirely disappear; and instead of being a hated monopoly, the gas company would become one of the most popular institutions of the place.

On motion of Capt. Wm. H. White, the thanks of the Association were tendered to Mr. Nettleton for the paper read.

Mr. Harbison—I would like to ask Mr. Nettleton whether he is willing to make the statement here that he made before the New England Association, in regard to the use of the electric light in his town.

Mr. Nettleton—Certainly, if the Association wishes me to do so; but I thought electric light would be so much talked about that the Association would not care to hear anything upon that subject at this time.

Mr. Neal—The gentleman stated that five per cent. of his consumption had been lessened by the introduction of the light.

Mr. Nettleton—The electric light originated in the United States, in the town in which I reside, with a firm known as Wallace & Sons. They have been working at it for several years, and have at last succeeded in producing a very good machine, and a candle for furnishing the light, which is, I think, equal, if not superior to anything in the

world. If you have noticed the accounts published in the English *Gas-Light Journal* of the doings upon the other side, I think you will have observed that wherever they have used the light a wire has been run from the machine to the candle. and then back to the machine again. Two, three, and four candles are treated in a similar manner. These men have succeeded in perfecting the candle, so that all they have to do now is merely to run a wire around their shop, and connect with it any number of candles they desire. In their own shops they have been exceedingly busy for the past two years, and have been obliged to run a large portion of their works for twenty-four hours; and most of the places where the men have been employed have been lighted by these electric lights. If they had been obliged to use gas, you can readily see they would have had a very large bill. Another fact I ask you to observe is, they still remain our largest customers, or about the largest. Another fact that I mention in this connection is, that they use the light exclusively where the coarse work is done. They use it in the model room, and in other portions of the building where coarse work is done, but in every place where they do anything like fine work they have to use gas. They tell me that, in their opinion, gas can never be supplanted by electric light where fine work has to be done. At all events, they are large stockholders in our company, which is certainly a very good argument in favor of what I have just stated; and besides that, I have a standing offer from them to buy more of our stock, at a certain price, if I can get it.

Another place where the electric light is used is in a large foundry. They have been excessively busy there for the last two years, and have been obliged to keep a set of hands running 24 hours. They have been using from three to eight electric lights. You can readily see, therefore, what effect the use of the electric light in these two places has had upon our consumption in that direction.

There is still another fact that I will mention, and that is that Mr. William Wallace, of the firm of Wallace & Sons, who has perfected this candle, as well as a machine for generating electricity, will be present at the lecture to-night, and if any gentlemen wish me to do so, I will be very happy to introduce them to him. You will find him a very pleasant gentleman, and if any of you have fears that electric light will supplant gas light, I think you can quiet your apprehensions on that point.

Mr. Neal—Before we adjourn, I would suggest that if any gentlemen wish to visit the works of the Municipal Gas Company, it perhaps be best for them to go now.

The President—I will add that you will be received with the utmost courtesy and attention, and you will be furnished with all the information that you may desire, and which they are possessed of. I will also state that there is a gas engine in the gas works at the foot of Eighteenth street. I have never seen it, but it is there, and I shall be happy to have any one of you, or the whole of you, call and see it. You need no card from me. The works are always open, and I have sent word that some of you may come, and you will fine some one to show you the engine and around the works. You will pardon me if I do not go with you, for I am very ill to-day; and besides that, I have several duties to perform which will prevent me from going to the lecture, and which will keep me busy until past midnight. I have also been requested to say that the room in which Prof. Morton is to deliver his lecture will accommodate about four hundred people, and that he will be glad to have you come and bring your wives, if you have any, and if not, your sweethearts, and New York can furnish as many of those as you desire. [Laughter.]

The Association then adjourned until 2 P. M.

Afternoon Session.

The Association met at 2 P. M., and was called to order by Mr. Price.

The next paper to be read is one prepared by Mr. McIlhenny, but I believe he is not in the room.

Mr. Cartwright—I think a number of gentlemen are just coming from lunch, and think it would be well to defer the reading of the paper until they are here.

Mr. Price—There are a number of interesting questions growing out of the paper which Mr. Nettleton has just read, and I think the time would be very properly taken up in discussing them. For instance, he speaks of a gas engine that he has introduced, and says that it is an expensive engine. I would like to know what it costs, and what it costs per horse power to run it. There are several questions growing out of this paper that I would like to have answered, and as he is not in the room, perhaps there may be some gentleman present who can give the information.

Mr. Sherman—I have seen the engine he refers to. I believe it is a four horse-power engine, and that its cost was, if I remember rightly, $800.

Mr. Coggsball—Mr. Nettleton informed me that the engine which was run by Mr. Wallace is a two horse-power engine, and that it cost $476. They have run at intervals of perhaps an hour, or two hours, from eight to ten hours a day. The engine which he is now setting up, I think, is to be a four horse-power engine, and is to be run ten hours a day. He can give you a better estimate of the cost than I am able to do. He charges them $2.50 for the gas to run it. Mr. Wallace informed him that the cost of running the machine was not so much as he expected it would be; and that it was really a cheaper motive power than he expected to have.

In regard to the gas stoves, that he speaks of in his paper, I think he sells a Providence stove, called "The Retort Gas Stove," which I am endeavoring to introduce myself in Fitchburg. I let them out at a small rental, and set them up, and take them away for the season. I introduced from 25 to 50 of them. I sent out circulars, as well as using my own efforts. The makers of the retort stove claim that one-eighth inch would be sufficient pressure. I give them a pressure of an inch and a-half, during certain hours, which gives a very satisfactory heat. Of course, ladies ironing during the day make some complaint that the pressure is not enough. I give an inch pressure, from eight o'clock until half-past eleven, and from half-past eleven until half-past one o'clock, I give them an inch and a half pressure, and we have no trouble in operating the stove to advantage.

Mr. Price—I have one of the same stoves in my kitchen. That runs very satisfactorily indeed with nine-tenths pressure. I am three miles from the works, but I have heard no complaint in regard to the pressure not being sufficient. I am not, however, at all sure that it is the best stove; and if any one has any information on that point I would like to have him furnish it.

Mr. Cartwright—How much does it consume per hour?

Mr. Price—I am not able to say; but I should think, very likely, about seven feet.

Mr. Coggesball—I have used a stove, in my own house, called the "Metropolitan Gas Stove"; and it has given exceedingly good satisfaction. We use it in the winter for broiling steak, or for broiling anything, for the reason that we can get such an intense heat that we consider it is very much nicer. The stove burns about fifteen feet per hour. We have two places for cooking, and they are both going at the same time frequently. We use about an inch, or an inch and a-quarter pressure. One objection is the stopping up of the little orifice of the burner, and occasionally we have to clean that out; after we have done so it works very nicely. I have sold quite a number of the other stoves, and I have got one of them also. I have two gas stoves at my house, and they afford all the cooking facilities required in the way of broiling meats.

Mr. Cartwright—In using your stoves do you employ any means for taking off the products of combustion?

Mr. Coggeshall—I have mine set in a back room, where it does not trouble us at all. If we had it in the kitchen it would trouble us, perhaps, when meat was broiling; but it would not be from the fumes of the gas because there are none.

Mr. Cartwright—You took no means for carrying off the product of combustion?

Mr. Coggeshall—No, sir; I would state that near the works which are running in Brooklyn, a man has established a factory for frying potatoes, and supplying the hotels and restaurants of Coney Island and Brooklyn, and he also ships them to other places, I believe. These are fried in lard; and the proprietor says that, by using gas under one set of pans, and coke under the other, he saves from 20 to 30 pounds of lard to the pan. That fact is attributable to the more even heating of the lard by the gas.

Mr. A. C. Wood—Mr. President: I have had a short experience with a gas cooking stove; and as I arrived at the actual cost of using it, my experience may be of interest to the members of the Association.

In July last I set up in my kitchen one single and one double atmospheric burner gas stove, attaching a meter to the same. With these two stoves was done all the cooking, baking, ironing, and necessary kitchen work, except washing, for our family of seven, some portion of the time nine; and for 45 days the consumption of gas was 1,600 cubic feet, which, at $2.75 per 1,000 (about the average price of gas) the cost was $4.40, or 9¾ cts. per day. For summer use, certainly, it is the cheapest fuel that can be used.

Mr. Price—I understand the gentleman who introduced the gas engine is in the room; and before Mr. McIlhenny reads his paper, I think it would be interesting to hear something about the engine, and perhaps Mr. Schleicher will tell us something about its cost and the cost of running it.

Mr. Schleicher—I will state to the gentlemen of the Association that we have one of our machines on exhibition at the Manhattan Gas Company's works, and it can be seen in operation there. The gas consumed by this engine, according to experiments made in England and in Germany, is about 21½ cubic feet per horse power per hour. The cost of running varies according to the price of gas in different cities. In some cities gas is very low; for instance, in Pittsburgh, where gas is $1 per 1,000, the cost of running an engine there is about 4½ cents per horse-power per hour, which is genarally cheaper than a steam engine, taking all expenses together. Taking the matter of fuel alone, it would cost generally a little more to run it than to run a steam engine, but taking into consideration the attendance required for a steam engine, the amount of trouble and time it takes to keep them supplied with coal, to clean out the ashes and dirt, the water, rent, etc., the cost of running the gas engine wil generally be found to be cheaper than the cost of running the steam engine. The cost of running the engines which we have in this country will be ordinarily about 4½ cents per horse-power per hour; but we expect to make them more economical in this respect, and we hope by and by, to give a very respectable consumption to the gas works through our engines. In Europe we have been selling them to quite an extent. Of course, we have there the advantage of restrictions against the steam engine. A steam engine cannot be put in a building where there are tenants living, and parties often have a good deal of trouble about putting a steam engine up, and they take a gas engine. One objection that was made to the engine we had at the Centennial Exposition was on account of the noise, but the present one is of much better construction. The German makers and the English makers have entirely discarded the old engine, and are making the new one. In one small place in Germany there is a manufactory where there are three hundred hands employed, and where they make gas engines exclusively. We have

started in Philadelphia only recently, for the gas engine is a comparatively recent invention. We have been turning out some engines that we have set up in Philadelphia, and we have sent some to the New England States. We have put up one in Massachasetts recently. We are finding a slow sale for it because of the high price of gas. There are several gentlemen connected with gas companies in Europe who have already proposed to us to reduce the price, as the use of our engines will find employment for the pipes during the day time, when they are generally idle. Besides, as they are used during the summer as well as during the winter, the consumption will be steady, and the pipes will thus be constantly utilized by a large quantity of gas passing through them. The percentage that is charged for the cost of distribution will decrease in proportion to the quantity of gas that goes through the pipes. We believe that by the use of our machine the utilization of gas as a fuel can be made practicable. We have been making these gas engines over in Europe for some time of large sizes, and have started to make them here now, but we didn't think it prudent to begin with the largest sizes first. We sell them from $400 to $750, according to the size. The price is not materially different from a good steam engine of the same size

Mr. Littlehales—What pressure would be required to run the engine?

Mr. Schleicher—They generally run better without any pressure at all; or, at least, very little pressure.

Mr. Littlehales—We had one in our works for about eighteen months, and it was an intolerable nuisance, for the simple reason that at the ordinary pressure it would not run; and in keeping up a higher pressure to supply this engine, we lost a dozen times more than the consumption of the gas amounted to. It seems to me very important that an engine should be able to work at low pressure.

Mr. Schleicher—They require a certain pressure, of course; but the pressure with our machines is of very little importance. As a general thing a little pressure is better than a high pressure. In Philadelphia the pressure, I believe, is from two to five inches. We have no alterations to make; it always goes along nicely and smoothly.

Mr. Littlehales—Would it work at a pressure of eight-tenths?

Mr. Schleicher—I believe it would. As I said, a little pressure is considered better than a high pressure. But if it would not work at that pressure, we could easily insert a pressure regulator.

Mr. Littlehales—Do you consider that a pressue of eight-tenths is sufficient?

Mr. Schleicher—Yes, sir, I do.

Mr. Littlehales—Do you think half an inch would be sufficient?

Mr. Schleicher—Yes, sir; we only require a certain amount, and that is very low; and we only require a certain sized pipe to have the quantity necessary.

Mr. Cartwright—Of course a machine of this character is to be measured by comparison with a steam engine of the same power. I would like to ask the gentleman why it is he considers the cost of this engine to be less than the cost of a steam engine of equal power. Is it in the workmanship?

Mr. Schleicher—Yes, sir; it is of different workmanship. It is a finer class of work than that required on a steam engine. Steam engines can be made of almost any quality. You can get them from $100 up to $300 for one-horse power, but our engine, to work successfully, must be made very exactly and very fine.

Mr. Cartwright—You don't mean to assest that the workmanship of the gas engine is superior to what is necessary for a steam engine, do you?

Mr. Schleicher—Yes, sir, it is.

Mr. Cartwright—In what respect?

Mr. Schleicher—In many respects. The openings of our valves must be made very exactly, or the engine will not work. If there is the slightest irregularity or defect the efficiency of the engine is destroyed, and it becomes necessary to guard against them with the utmost care. All the functions of the engine must be performed at precisely the right time and in the proper proportion; and therefore it is necessary that the machine should be constructed in the most careful and exact manner possible.

Mr. Cartwright—Are not all these things necessary in a well-constructed steam engine?

Mr. Schleicher—They are in a well-constructed steam engine, and that is the reason why such steam engines are selling at the same price as our engine. Where the same amount of care is bestowed upon the construction of a steam engine, they will be quite as expensive as ours; but there are a great many steam engines put on the market to sell that are by no means well or carefully constructed. Such engines can of course be bought cheaper than our engines can, because, although every part of such a steam engine does not work perfectly—that is, is not finished in the most exact manner—yet they do their work and answer the purpose for which they are employed. But in our engine, unless every part works with the utmost nicety, the machine will not operate at all. Every function, however minute, must be performed with perfect regularity, at precisely the right moment of time. We have to put the highest class of work on our engines. Besides that, we have very much larger cylinders, and very much larger pistons, for the same power, than a steam engine.

Mr. Cartwright—I can readily see how that would add to the cost. Because, of course, the larger the piston the greater the expense. But I am very unwilling to admit that there is any more, or any better, work required on a gas engine than there is on a properly constructed steam engine.

Mr. Schleicher—We build engines in large quantities in England as well as in Germany. In our German works there are about 300 engines made at once. They have special departments or factories for special parts; and although the cost of construction is very low, still, the prices even then are higher than the price of ordinary steam engines.

Mr. Cartwright—I do not wish to interpose any objection, of course, to the gas engine, because, if a proper engine could be introduced, it would be a benefit to the gas companies. But if an engine is to be introduced of excessive cost, either by reason of the extra workmanship upon it or the royalty that must be paid, of course that places an embargo upon it at once.

Mr. Schleicher—We have already started the prices lower than they are at present in England, although the wages that we pay are from 35 to 40 per cent. higher than they are in foreign countries.

Mr. Cartwright—All that does not lessen the cost in comparison with the steam engine, and the work done with the steam engine. Take, for instance, the Baxter engine. The manufacturers of that engine probably have as perfect a system for making the different parts of the engine interchangeably as any other concern in the world, not even excepting Germany or England. But still we find that an engine of a certain horse-power (take the Baxter for an illustration, where the workmanship, if not equal to that of the gas engine, is certainly very little inferior to it), is yet cheaper than a gas engine of the same power.

Mr. Schleicher—We are at present selling our engines cheaper than the Baxter.

Mr. Cartwright—Perhaps there is an excessive royalty upon the engines; if so, of course that would make a very great difference in the cost.

Mr. Schleicher—The royalty is not excessive. I again repeat that our prices are lower than the Baxter engines.

Mr. Cartwright—Of equal power?

Mr. Scheicher—Yes; but there are at present a great many second-hand engines in the market, and of course those can be bought cheaper. Our two-horse power engines are $400; and Baxter's two-horse power engines are $400 our four-horse power engines are $550, and Baxter's four-horse power engines $600; our seven-horse power engines are $750, and Baxter sells his six-horse power engines at $800. These prices are of course subject to some discount, but that is a matter of arrangement between the purchaser and the seller.

Mr. McIlhenny—Before reading the paper that I have prepared, I would like to offer a resolution; and before offering it I desire to make an explanation. It appears there is a provision in our Constitution prohibiting the Association from accepting any courtesies or hospitalities. It is either a provision of the Constitution or a resolution passed to that effect. I was not at the meeting when the resolution was passed, or I certainly would have had something to say against it. It now appears that we are likely to leave New York without having an opportunity of meeting each other socially, and the nice sensibility of the members, in compliance with the resolution, is not likely to let us have that pleasure. I think this gathering should not be permitted to end without having something of that kind, as has been the custom in nearly every place in which we have heretofore met, I think we ought to pass a resolution that we will meet to-morrow, say at four o'clock, and have a dinner and a sociable talk together. Major Dresser and I inquired at the hotel, this morning, to ascertain the terms upon which a dinner could be furnished. A first-class dinner, gotten up entirely independent of the guests of the hotel, can be furnished for $6 a head; but the gentleman stated that he would furnish an ordinary dinner to all those who are stopping at the house, exclusive of wine, of course, and all those who were not stopping at the house would be charged $1.75 each, which is the ordinary price of a dinner at the Fifth Avenue Hotel. I want to get the sense of the Association on that point. It seems to me we ought to have some opportunity of meeting socially, and it appears we shall not have an opportunity, except we make provision for it ourselves. It has been the custom, ever since this Association has met, to have something of the kind, and I hope we shall not leave this metropolis of the country without having the privilege of meeting each other in some such way. I move, therefore, that the members of the Association form themselves into a dinner party to-morrow, at four o'clock, and pay the expenses themselves.

Mr. Neal—It would be very pleasant to members to dine together, even if they partook of an ordinary dinner; and after dinner there might be a good deal of friendly feeling and sentiment exchanged. I have no doubt we should all enjoy ourselves very heartily. I am in favor of the resolution. I think the proper time for the dinner to have taken place would have been this evening, if it had not been for the lecture that we are to listen to from Prof. Morton. I fear that by to-morrow evening many of our members will have left the city. I do not think that our session will be protracted beyond to-morrow, at twelve o'clock; and, for that reason, am afraid that many of our members will not be present. Those who remain, however, can have a very pleasant time; but I think it is very important to have as large a gathering as possible. And I hope we will get an expression from the members as to their intentions, whether they propose to remain, so as to attend the dinner at four oclock to-morrow, or whether they will be obliged to leave for home. I, therefore, would suggest that we put it to vote, in an informal manner, in order to see what the sense of the Association is.

Mr. Stanley—I move to amend the resolution of Mr. McIlhenny, by making the hour two o'clock instead of four.

Mr. McIlhenney—I accept the amendment.

Mr. Harbison—There are a few gentlemen present who cannot eat dinner in an hour, particularly when they have nothing to wash their dinner down with. It takes longer to eat dinner under these circumstances, and I think if the gentlemen sit down to dinner at two o'clock, they will not get through in time to take the three o'clock train for home.

A Member—That depends upon the length of the neck. Laughter.

Capt. W. H. White—It is eminently fitting and proper, it seems to me, that we should have some pleasant social gathering of this kind when we meet. We always do so, except when we come to New York city. The resolutions adopted by the Executive Committee were wisely adopted, I suppose; but this little dinner, gotten up in an informal manner, by every member paying for his own dinner, and by those desiring to drink wine, paying for their own wine, is certainly independent and strictly upon democratic principles. After we have eaten dinner we can have a social talk together, and there will still be ample time for members to get from the hotel to the trains. There are horse cars and stages to take you to the depots, and there is the elevated railroad to take you, if you are not sufficiently elevated yourselves to get there, down to the five o'clock boat. It seems to me that when we meet every year we should have a real social, pleasant time together. This has been the custom with the New England Association for years. The most pleasant part of our meeting together there is the social little banquet we have there sometime during the session. It is so also with our foreign brethren. Both the French and English Associations never think of meeting without having a dinner. It cultivates a spirit of kindly feeling between the members, which is one of the purposes of our Association; and I think we should by all means have this little gathering. For my part I heartily endorse the resolution, and hope that it will pass.

Mr. Cornell—If it is desirable to get through with the dinner earlier, so that members may take the afternoon trains for their homes, let the hour be fixed at one o'clock.

Capt. W. H. White—I would suggest that the regular hour for dining at the Fifth Avenue Hotel is two o'clock, and the proprietor would much prefer to give us our dinner at the regular dinner hour. The hotel desires to give those who are boarders their dinner without extra charge; and, of course, they would prefer to do so at the regular hour.

Mr. Price—I will take the responsibility of asking how many of the gentlemen present can make it convenient to be at the hotel to-morrow at two o'clock?

Nearly all of the members in the room signified their intention of being present.

Mr. Helme—I would suggest that as we are not going to have but one session to-morrow, we prolong the morning session until after twelve o'clock, say, until one. That would give us an hour to get ready for dinner. If we sit down promptly at two o'clock, we will get through in ample time, for those who wish to do so, to leave for home.

Mr. Price—I would like very much, personally, to have something like unanimity in this matter. I attended a banquet at the New England meeting, two years ago, and I enjoyed it very much. The one we had in Washington was also very enjoyable. I like the suggestion of having a dinner tomorrow; but if we do I hope it will be pretty unanimously attended. It would not be very gratifying to have but 20 or 25 members present; but if nearly all the members can attend I hope the resolution will be adopted.

The resolution, as amended, was adopted.

Mr. Helme—I would suggest that some hour and place be fixed when gentlemen who intend to be present will give their names.

A member—I move that a committee be appointed, consisting of Capt. White, Mr. Helme, and Major Dresser, to take this matter in charge. Carried.

To be continued.

Natural Gas in Missouri.—Kansas City, Mo., expects, soon to be lighted with natural gas. In various places around the town, people who have sunk artesian wells have struck gas veins. At Wyandotte, two miles off, there is an abandoned salt-bore that for five years has given off 25,000 feet of gas a day.—*Polytechnic Review.*

Crystal Palace District Gas Company.

Mr. Magnus Ohren, secretary of Crystal Palace District Gas-Light Company, of London, has kindly favored us with the following report of the half-yearly meeting of that company, from which we make the following extracts—refering to the *electric light*. Ed.

The half-yearly meeting of this company was held at the Albion Tavern, Aldergate street, London, on Thursday, Oct. 19., Erasumus Wilson, Esq., F.R.S., in the Chair.

The reports and accounts which have already been published were read.

The Chairman, in moving the adoption of the report and accounts, said—

Gentlemen—We are able upon this occasion, as upon past occasions, to make a satisfactory report with regard to the progress of the company during the past six months. You will observe that we have taken advantage of the opportunity which has been thrown in our way of obtaining a contract for a considerable supply of coals, which will last us until March, 1880. The advantages which we derive from having this stock in anticipation, and at our hands, will show themselves in the after profits which we hope to be able to make during our working.

We have also recurred to a custom which commenced at a very early period of our existence—that of reducing the price of gas to the consumers, and, as you will perceive by the third paragraph of the report, the price of gas to the general consumers is henceforth to be 3s. 9d. per 1,000 feet. We are, you see, by degrees, coming down to the minimum price charged in the Metropolis. This reduction has not been made without carefully inquiring into the state of the finances of the company. We have also used our best exertions to maintain the degree of purity of gas which is judged best suited to the purposes of our consumers. The last paragraph of the report will tell you how, after having allotted a portion of our profits to the reserve fund, we are still able to carry over £914 to the profit of the succeeding half year. All these points show the healthy state of the company, and we ourselves feel very confident that the concern is working as well as possible. But there is no doubt that some of the shareholders may have had their interest in gas manufacture somewhat influenced by the reports which have reached them on the subject of electric light. Epidemics of diseases occur from time to time, epidemics of discovery, epidemics of alarm.

We are dealing with one of the leading products of the country—coal—and we are converting it into the material of our manufacture. It has been proposed of late years to make electricity subservient to a similar purpose, and an experiment upon a very large scale is at this moment being made in Paris, in order to show the amount and extent of light which can be produced by that agent. I call it advisedly an experiment, because, as it is carried out in Paris, it would be inapplicable to practicable purposes. It has been conceived that because there is a great light which has been modified by careful contrivances it must naturally be a thing which is to supersede other modes of obtaining light. But there is another side to the question. We may buy our advantages too dearly, and the buying of electric light would simply tend to our bankruptcy and ruin. At the present moment it is impossible to obtain the light or regulate it without an amount of expense which would render it highly extravagant. In fact, the light, even in itself, is only applicable at the present moment to the public lighting of streets; it would be impossible to introduce it into our houses—to place the control of the electric apparatus under the direction of our housemaids; for we might be seized in the middle of the night with a tremendous fit, that would make us believe that the end of the world was at hand, and then find out perhaps in the morning that it was some little neglect on the part of the manager of the electric machine that had shaken every muscle of our bodies to our very toes. We have troubles enough in the control and management of coal gas; our trials would be greatly enhanced if we had to deal with an element that requires such careful, such scientific manipulation as electricity. I believe that the smallest electric light that can be at present produced is a blaze amounting to a light of 1,000 candles. Now, this blaze would be so great that it would put out the eyes of those who looked upon it, and it would produce such deep shadows as to render the roads at night even more dangerous than they would be in perfect darkness; but as man is never at a loss for contrivances, a method has been discovered by which the light may be reduced to 700 candles, which is not so unmanageable or uncontrollable. A separate apparatus, worked by a steam or a gas engine, is required for each group of lights, about 300 yards apart. The position of the matter at the present moment is such that it need not excite the slightest apprehension in our minds that so useful an article as that in which we deal is likely to be interfered with for a considerable number of years. Of course, science is progressive. There is no calculating to what limit science may advance; but if the agitation of this question is calculated to produce cheap gas shares, my advice to every one here would be to buy them.

The alarm will not induce me to sell a single share. It might be supposed that such a great light as 700-candle power cannot be obtained by any other means; but I am informed that Mr. William Sugg, who is now making experiments upon this subject in Paris and at home, has succeeded in producing a burner, which, with a consumption of 300 feet of gas per hour, will produce a light equal to the electric light I have been referring to. An 8 horse power gas engine, to work the electric machine, consumes 300 feet of gas per hour. With the electric light, the candles must be constantly changed, whereas the gas burns continuously. Of course, at the present time we are not sufficiently acquainted either with the process itself, or with its various details to come to any very satisfactory conclusion; but it may be fairly stated, with regard to the experiment which is going on in Paris, that when the Exhibition is at an end this electric light will come to a close, and that it is rather to be regarded as an ornament to the present display which is taking place in Paris than as a practical, solid application which would make us feel that it was a thing to be dreaded. My conclusion would be simply this, not to fear it in the slightest degree, but, nevertheless, we may keep our eyes open to the progress of science, and be prepared, when the opportunity arrives, to avail ourselves of it as well as others. I now beg to propose that the report, with the accounts appended thereto, be received, adopted, and entered upon our minutes.

Mr. F. L. Linging seconded the motion, which was unanimously agreed to.

Connellsville Coke.—About 42,000,000 bushels of coal are required to manufacture the 63,000,000 bushels of coke produced in the Connellsville district. The coal is of unusual quality, and stored in the earth in an unusual manner. It is in thick veins, unusually soft, and is mined for three-quarters of a cent per bushel, with which pay miners are satisfied, owing to these advantages, and also to the measurement of all the gobbing into the bushels for which they are paid, there being nothing screened out.—*Coal Trade Journal.*

Economy in Wealth.—The French work people are saving, as everyone knows. Guizot gives the following as the cause of the prosperity of the nation: "Habits of prudence have penetrated all classes. There are very few families, even among the lower classes, that spend all their income. A single manufacturer in my town of Sisieux puts by, and has long been doing so, 600,000 francs a year. The wealth of France has at least doubled during fifty years; and, as the population has augmented during that time by only one-tenth. It is obvious that the comfort of the people has increased enormously.

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SATURDAY, NOVEMBER 16, 1878.

Official Report of Examinations of Gas for two Weeks ending Nov. 9, 1878, made at the Photometrical Room of the Department of Public Works.

Corrected Illuminating Power.

Oct. 1788.	Time of Day at which Test were made.	New York Gas Light Co.	Manhattan Gas-Light Co.	Mutual Gas-Light Co.	Metropolitan Gas-Light Co.	Harlem Gas-Light Co.	Municipal Gas-Light Co.
28	Between 9.30 A.M. and 1 P.M.	16.29	17.61	20.36	17.18	16.50	
29		16.85	19.56	20.99	17.65	16.46	
30		16.85	16.89	20.10	17.99	16.35	
31		16.18	17.03	19.58	17.81	16.19	
Nov. 1		16.68	18.13	20.00	17.88	16.01	
2		16.88	17.80	20.00	17.77	16.24	
	Average	16.62	17.83	20.17	17.71	16.29	
4		16.98	18.10	20.45	17.33	16.78	
6		16.57	17.86	20.89	17.20	16.44	
7		16.50	17.19	19.58	17.57	16.42	
8		16.08	17.36	19.73	17.46	16.53	
9		16.85	17.09	19.91	17.68	16.49	
	Average	16.59	17.52	20.11	17.45	16.53	

Sugg-Letheby burner.
E. G. LOVE, Gas Examiner.

Fires.—An extraordinary fire occurred at Prestone on Monday evening. A shopwoman, in the employ of Mr. Parkinson, oil and lamp merchant, Church street, in showing a customer how to trim a lamp, took up a measure of benzoline oil in mistake for paraffin to pour it into the lamp, when it ignited. Being frightened, she then threw down the oil, and it flowed over the shop in flames, igniting everything it came in contact with, including other oil. The whole of the premises were speedily in flames, and the shop and house were completely gutted. A large stock of inflamable goods was destroyed.—*The Ironmonger.*

Correspondence

[We are not responsible for the opinions expressed by Correspondents. Correspondents, in all cases, should sign their communications with their names and address in full—not for publiction, unless desired, but as a guarantee of good faith.—ED.]

Proposed Association of Gas Managers' Assistants.

To the Editor of the Gas-Light Journal:

DEAR SIR:—I am desirous of making your valuable journal the medium whereby I may bring before my brother gas assistants and clerks a subject which I feel is of considerable importance.

By way of preface, allow me to call attention to the fact that the success of gas managers' associations has been proved beyond all doubt. Now to come to the subject in hand. I think it will be freely admitted that a gas manager has to fill a position in which many and varied qualifications are necessary; and the course by which a young man is fitted for this important office is strewn with many difficulties. So if any means exist whereby these obstacles could be lessened, and the course made a little more certain, I think that advantage should be taken of the same.

Now, although I do not pretend to have a panacea for all the ills, still I claim that great good would result from our forming among ourselves an association, to be known by some such name as the "American Association of Gas Assistants and Clerks," and that thereby, if we succeed to the charge of gas works, we will act to greater credit to ourselves and more profit to our employers; for I feel that it does not need any argument to show that those results would be inevitable if we thus made each other's acquaintance, with the opportunity of mutually exchanging our ideas and experiences.

One great difficulty which a young man has to contend with at present is his inability to examine the various processes and new modes of working which are in operation at the various gas works; for by experience he is taught that he is not sure of a cordial reception, as he is not able to introduce himself to the manager as a brother manager; whereas, if the various assistants were acquainted with each other, they would feel at liberty to call upon each other, as occasion served.

I have been struck with the marked ability shown in the address of Mr. Corbet Woodall, delivered before the British Association of Gas Managers at the June meeting, and cannot refrain from quoting from it, as showing the gas man's training.

"I make these remarks because I wish—treading in the steps of several of my predecessors in this chair—to draw the attention, especisily of our younger members, to the growing necessity for thorough preparation on the part of those who are to follow, and obtain success, in the profession of Gas Engineering."

What I urge is that the question of training becomes, year by year, of greater moment; "rule of thumb" less possible; and, to quote a remark of Mr. Bruce Bell, "an uneducated engineer is as likely to succeed as an uneducated schoolmaster."

I appreciate the difficulties which would be encountered in the formation of an association such as I propose; but, after mature deliberation, I feel that they are more fanciful than real, that they could easily be overcome; and that if a sufficient number of the young men, filling positions similar to my own, would unite with me we could form an association such as I have mentioned, and make of it a lasting success.

ASSISTANT.

Temperature of Flames.—Signor F Rosetti has made the temperature of flames the subject of a series of investigations. For this purpose he made use of the calorimeter of his own invention. The maximum temperature of a Bunsen flame he has found to be 1,360° Cent., obtained by the combustion of one volume of gas and two and one-fifth volumes of air. The admission of either a greater or less quantity of air reduces the temperature. Changes in pressure have but a slight influence on the temperature. The flame given by gas diluted with its own volume of nitrogen shows a temperature of 1,180°, and diluted with three volumes of nitrogen, 1,040°. The same degrees of dilution with carbonic acid show respectively 1,100° and 780°. Among other temperatures noted were the following: From Locatelli lamp, 920°; stearine candle, 940°; petroleum lamp, with chimney, 1,030°; the same without chimney, illuminating part, 920°; sooty envelope, 780°; alcoholic lamp (alcohol, 0.912), 1,170°; ditto (alcohol 0.822), 1,180°. The difference in the heating power of alcohol resulting from widely differing percentages of water is considerable.—*The Engineer.*

Painting Iron Work.

At a recent meeting of the Liverpool Engineering Society, the President of the Society, Mr. C. Graham Smith, delivered an address upon the paints used for ironwork. He said the usual varieties employed for preserving it against corrosion may be divided into lead, iron, oxide, silicate, and tar paints. Differences of opinion exist as to the relative merits of the first three descriptions, but the experience of many is decidedly in favor of lead paints, when of good quality and mixed with good oil, without spirits. A little white lead mixed with the red makes it go further and easier to work into corners. If the coats are put on with pure red lead, owing to its weight it is liable to run off; but the last coat should consist of red lead alone. The tar paints are more often used for ironwork which is not to be seen, such as water pipes, floor plates of bridges, and girders which are to be built into masonry or brickwork. It is cheap and answers well for such purposes, and for sea-work, as it is said not to foul so readily as lead or other paints of a finer description. A good rough paint of this class may be made by heating ordinary coal tar, and mixing with it finely sifted slacked lime, in the proportion of between half a pound and a pound of lime to a gallon of tar, adding sufficient naphtha to render it of a convenient consistency for laying on. This composition should be applied while hot, but care should be taken not to keep it over the fire too long, or it will lose its essential oils, and be reduced to a substance in all points resembling pitch. Some positions admit of the paint being sanded, in which case it should be done, as it adds to its durability. Before painting ironwork it is usual to give it a coat of boiled linseed oil, applied hot; this forms a kind of varnish, and is found to be an excellent preparation for the after coats of paint. Opinions differ as to when the coat of oil should be applied. Some engineers specify that the iron should be brushed over or dipped in oil while hot from the rolls. The efficacy of this method is doubtful, as the iron, in undergoing its workshop manipulation, is subject to rough treatment, and portions of its surface are sure to become exposed. Others specify that the iron should be brushed over with hot oil just previous to the various portions being placed together. This answers well for ordinary work, as by the time it has gone through the workshops the blue shales have to some extent been knocked off. These shales are in a greater or less degree inseparable from the manufacture of the iron; but it is very important that they should be removed by some means or other before the paint is put on, for if not, in a short time they will peel off and bring the paint along with them. The best way to guard against this is to have the ironwork put together in the yard and tested previous to either oil or paint being put upon it. A slight rust will form over the whole surface of the work, which will cause the blue shales to fall off. The rust should then be scraped off and the whole of the work rubbed down, which will render the surface peculiarly fitted for receiving the after coats of oil and paint. The oil should follow up as closely as possible the man cleaning the work. It is almost needless to point out that the efficiency of this method entirely depends upon the thoroughness with which it is done.—*Hardware.*

A Chance for the Electric Lamp.—The Brazilian Minister having received from his Government authority to invite proposals for the illumination of the City of Rio Janeiro, will receive bids from citizens of the United States up to December 2d, and they will be opened at Rio, on January 1, 1879. The contract with the British Gas Company, which now illuminates that city, will expire in March next. Minister Borges yesterday received a telegram from his Government announcing that that company would dispose of all its material, buildings and machinery for $2,651,756.

Prices of Gas Coal.

Waverly Youghiogheny	5.25	
Moore's "	5.50	
Shafton	5.35	
Despard Marion	5.15	
Newburgh Orrel	@	3.85 at Baltimore.
Murphy Run	5.25	
Chesapeake and Ohio Agency Coal	5.25	4.00 at Richmond.
Newcastle	3.75 @ 3.85	
Provincial	4.15 @ 4.50	
Cannelton Cannel	10.00	
Ince Hall	8.00	

Gas Stocks.

Quotations by G. W. Close Jr., Broker and Dealer in Gas Stocks.
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November 16, 1878

☞ All communications will receive particular attention
☞ The following quotations are based on the par value of $100 per share. ☜

	Capital.	Par.	Bid.	Asked.
Gas. Co.'s of N. Y. City.				
Central	466,000	50	—	80
Harlem	$1,800,000	50	35	43
" Bonds	170,000			103
Manhattan	4,000,000	50	147	150
Metropolitan	2,500,000	100	105	108
" Scrip	$1,000,000	..	94	98
Mutual	5,000,000	100	55	65
" Bonds, gold.	900,000	1000	95	101
Municipal	1,500,000	100	75	80
" Bonds	750,000		95	98
New York	4,000,000	100	75	85
Northern	270,000	50	—	100
Gas Co.'s of Brooklyn.				
Brooklyn	2,000,000	25	115	120
Citizens	1,200,000	20	55	60
" Scrip	220,000	1000	90	95
Peoples	2,000,000	10	15	20
" Bonds	$ 325,000	...	--	95
" Scrip	300,000	...	75	80
Metropolitan	1,000,000	100	55	60
Nassau	1,000,000	25	50	56
" Ctfs.	700,000	1000	—	90
Williamsburgh	1,000,000	50	80	90
" Scrip		...	90	95
Kings Co	200,000	100	80	90
Union Co. E N. Y.		25	—	50
Richmond Co., S. I.	300,000	...	80	90
Out of Town Gas Companies.				
Bath, Maine	70,000	100		
Buffalo Mutual, N. Y	750,000	100	65	70
" Bonds	200,000	1000	95	100
Baltimore, Md	2,000,000	100	95	98
" Ctfs., gold	1,000,000		95	101
Bayonne, N. J		100		90
Brockport, N. Y	25,000	100	...	80
Citizens, Newark	918,000	50	—	95
" " Bds.	124,000	—	105	107
Chicago Gas Co., Ills			128	130
Cincinnati G & C Co				190
Derby of Conn	160,000	100	60	80
East Boston, Mass.		25	114	120
Elizabethtown, N. J.	300,000	20	—	130
Fort Wayne, Ind		100	...	—
Hannibal, Mo	100,000	100	95	100
Hartford, Conn	700,000	25	140	148
Hempstead, L I	25,000	100	...	—
Jersey City	386,000	20	120	130
Jamaica, L. I	25,000	100	...	—
Jacksonville, Ill	120,000	50	82	...
Lewistown Maine	400,000	100	70	80
Lima, Ohio,	60,000	100	—	...
Bonds	30,000		90	
Laclede St Louis Mo.	1,200,000	100	—	75
Long Branch		20	40	50
New Haven, Conn		25	130	140
Peoples, Jersey City		...	—	85
" " Bds.				95
Peoples of Albany	650,000	100	10	17
" Bonds	350,000	1000	--	-
Peoples of Baltimore		25	44	48
" Bonds			106	—
Plainfield, N. J	80,000	100	—	105
Perth Amboy		25	—	95
Rochester, N. Y		100	50	60
Woonsocket, R. I	150,000	100	95	...
Halifax N. S	400,000	40	148	150
Hamilton, Ontario	150,000	40	117½	
San Francisco Gas Co., S. Fr'sco Cal.			95	95¼
St. Louis, Missouri	600,000	50	73	75
Stillwater, Minn	50,000	50	—	26
Saugerties, N. Y	15,000	100	95	100
Troy, Citizens	600,000	100	—	60
Toledo, Ohio			95	97
Washington, D. C		20	—	200
Yonkers		50	70	80

100 shares of Jersey City gas stock, sold at auction, @ 124-125. 30 shares of Metropolitan, of New York, @ 106½; $1510 scrip, of same company, @ 93⅜.

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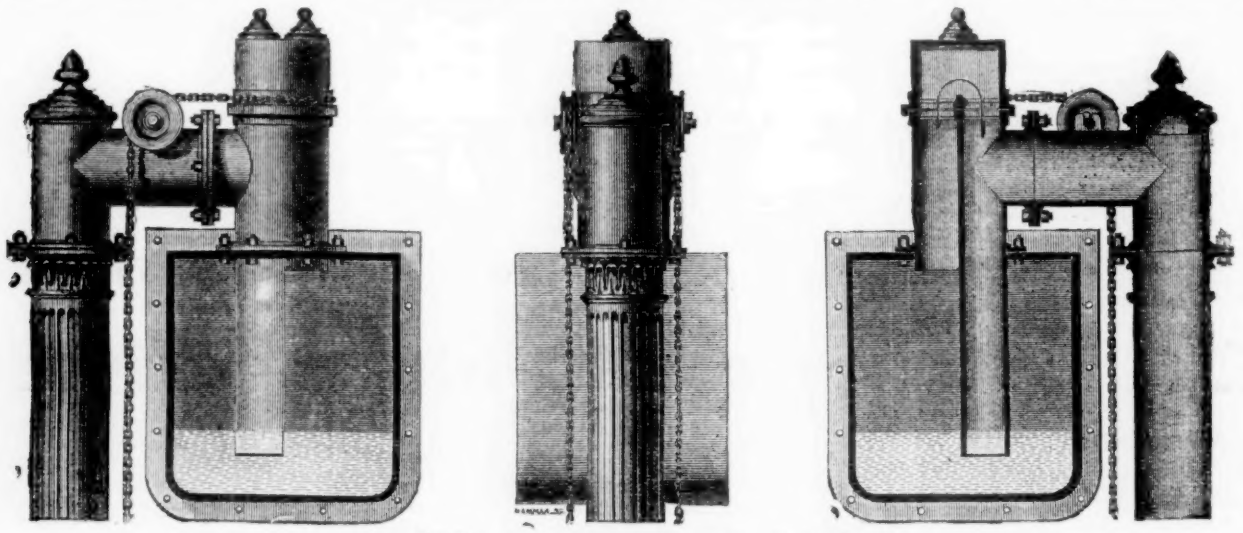

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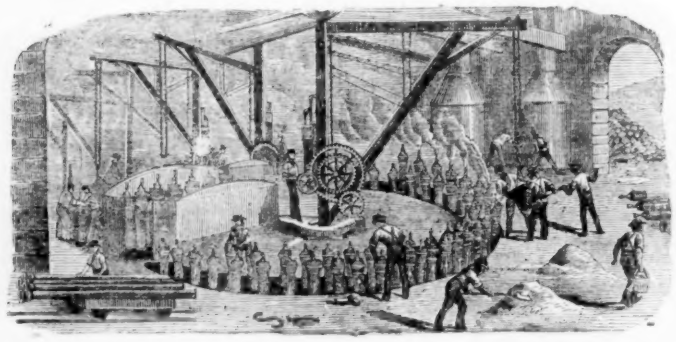

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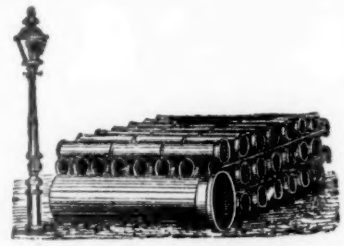

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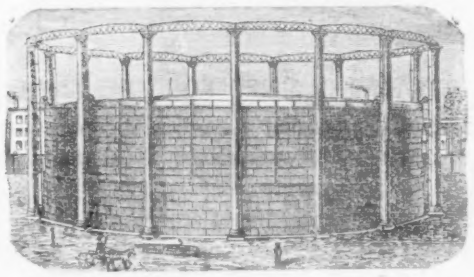

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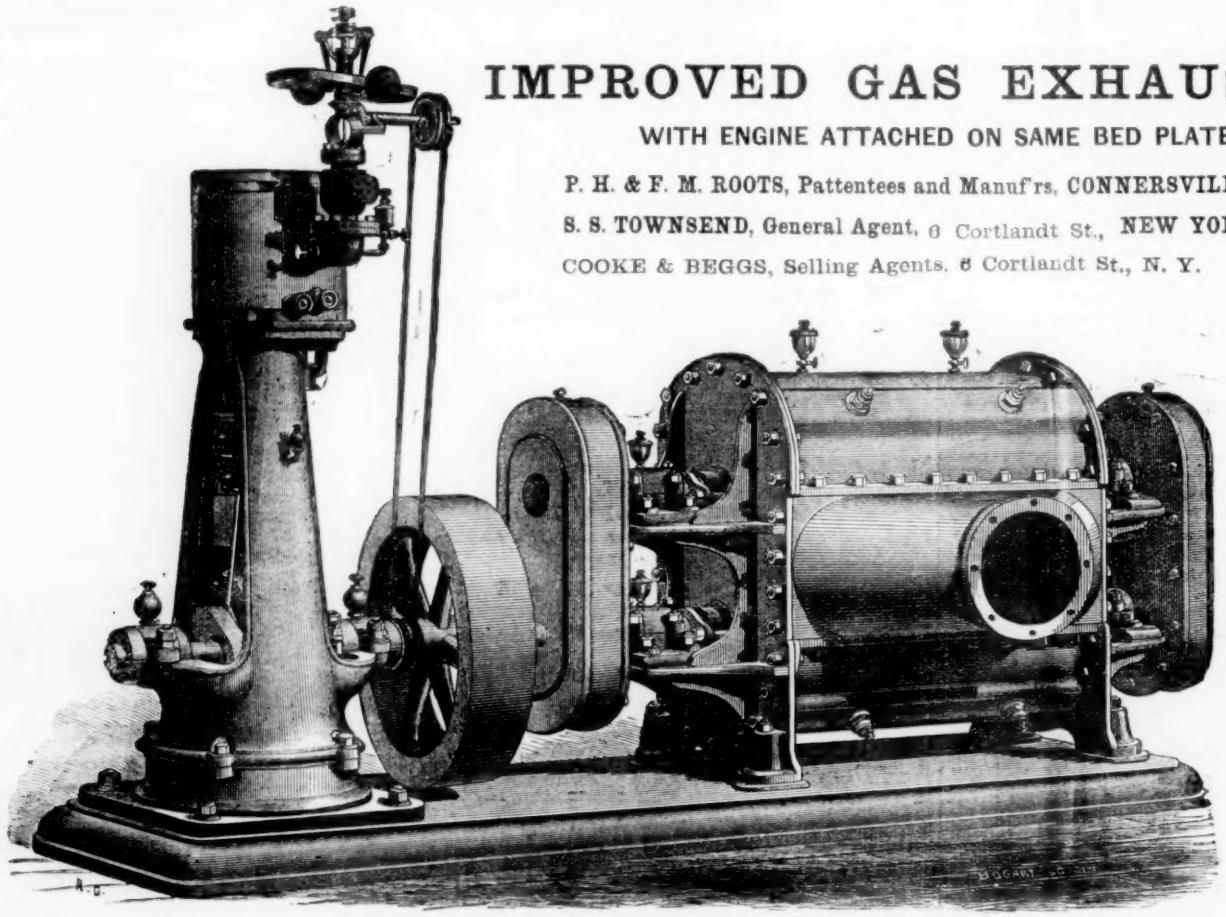

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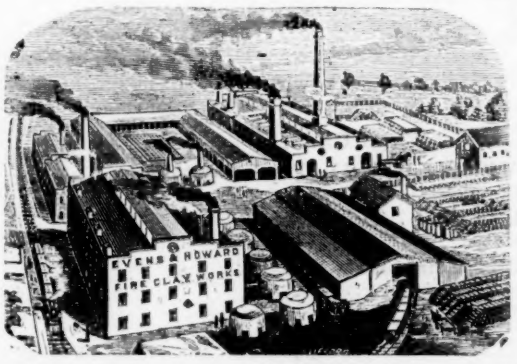

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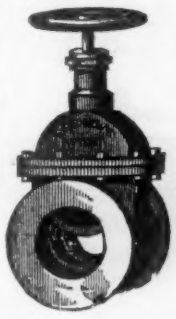

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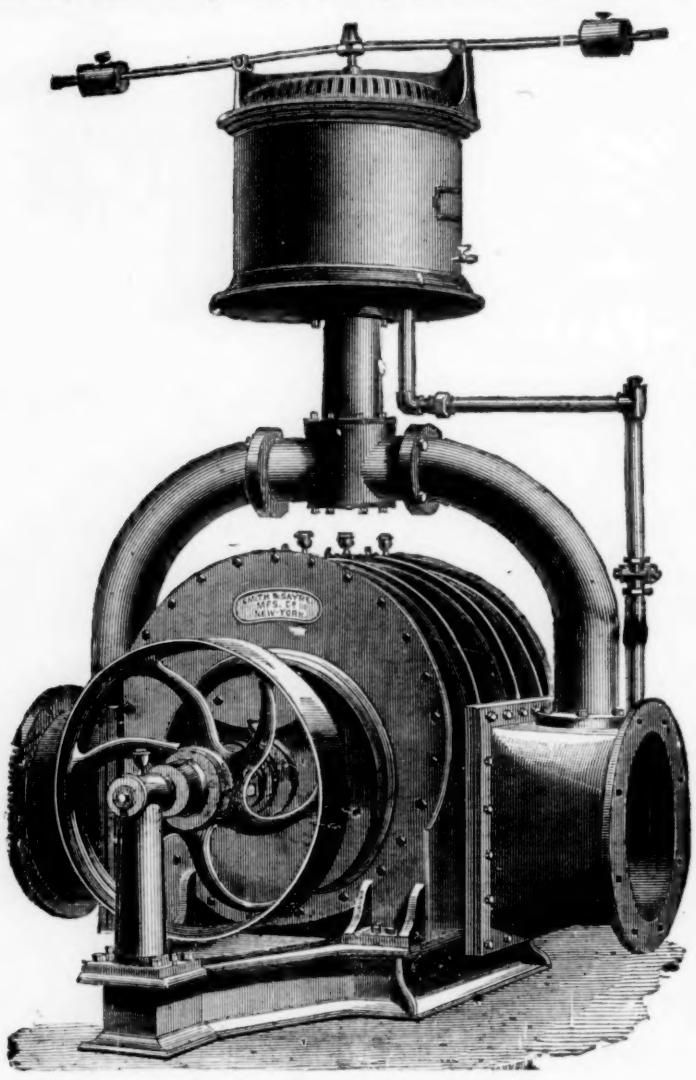

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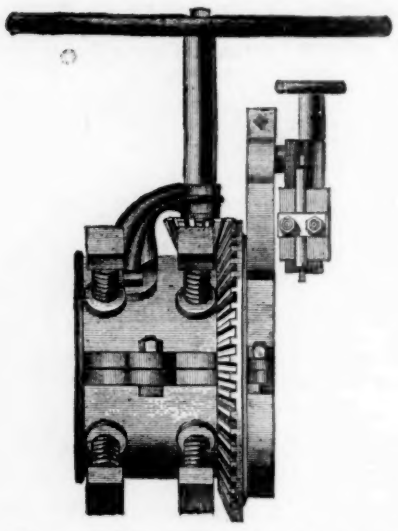
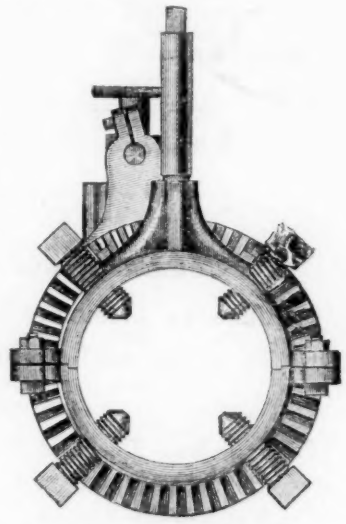


REDUCED RATES:

No. 1 cuts 3, 4 and 6 inch Pipe $75
No. 1 1-2 cuts 4, 6 and 8 in. Pipe, $85
No. 2 cuts 8, 10 and 12 in. Pipe, $100
No. 3 cuts 16, 18 and 20 in. Pipe, $225
NO. 4 cuts 24 and 30 inch Pipe, $275
No. 5 cuts 36 inch Pipe, $350

For larger sizes Special Contracts will be made.



It will cut a Continuous Line of Pipe in a Trench or Building

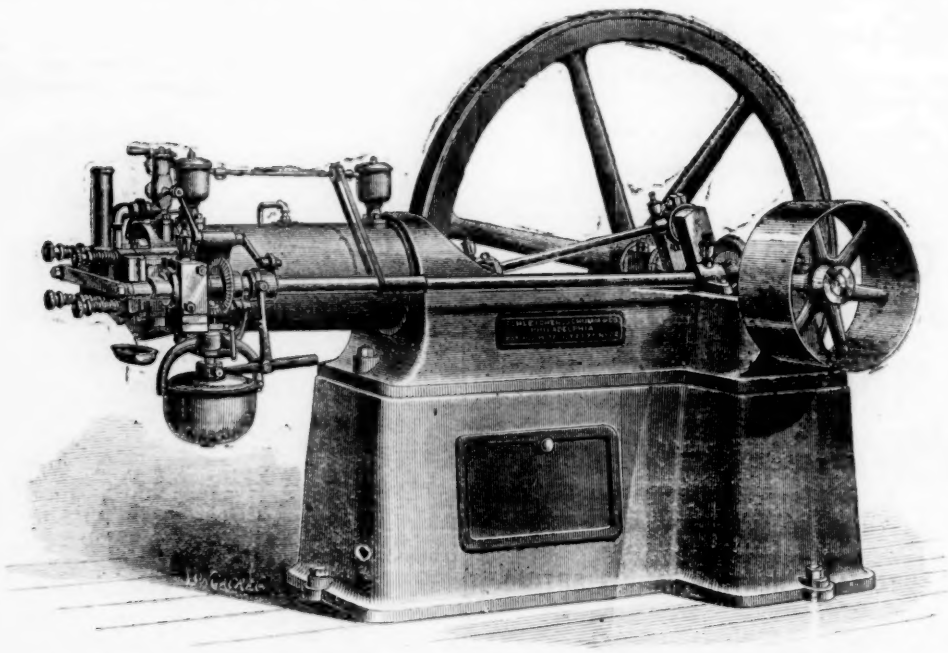
As well as loose Cast or Wrought Iron Pipe, Shafts or Columns of any size, leaving the ends clean, smooth, and square.

Our Machines for cutting 20 and 30-INCH PIPE have been furnished the Manhattan and New York Gas Light Companies; also for cutting 12, 20, and 30 inch Pipe to the Boston Gas-Light Company. The smaller sized Machines have been in practical use in various parts of the country by Water and Gas Companies, for over two years, and all with the most satisfactory results. Address

A. C. WOOD, Syracuse, New York.
HERRING & FLOYD, No. 744 Greenwich street, N. Y.
BROWN & OWEN, 20th and Filbert Sts., Philadelphia.
MORRIS, TASKER & CO., 36 Oliver Street, Boston, Mass.

SILENT GAS ENGINE.

Always Ready to be Started, and to give at once Full Power.



NO STEAM TO MAKE OR MAINTAIN.

NO COAL, NO ASHES, NO DIRT.

NO FIRE, NO DANGER, NO EXTRA INSURANCE.

NO GAUGES, NO PUMPS, NO LEAKAGES.

ALMOST NO ATTENDANCE.

BURNS COMMON GAS.

AVERAGE CONSUMPTION PER HORSE POWER,

21 1-2 Cubic Ft. Per Hour.

COSTS NOTHING WHILE STANDING, LITTLE WHILE RUNNING WITHOUT DOING WORK, AND WHILE WORKING THE GAS IS PRECISELY REGULATED BY THE GOVERNOR IN PROPORTION TO THE POWER DEVELOPED.

SIZES AT PRESENT OFFERED, **2, 4 and 7 H. P.**
LARGER SIZES TO ORDER.

THE NEW OTTO SILENT GAS ENGINE.

Unexcelled for Convenience and Economy in running Gas Exhausters, Tar and Ammonia Pumps, Hoists in Warehouses or Stores, Ventilating Theatres, Halls and Buildings, Driving Electro-Magnetic Machines,

And useful generally for all work of small stationary steam engines. Where work is intermittent, trouble with a steam boiler and engine is at its maximum, but ...tity minimum with a gas engine. For particulars, prices, etc., apply to

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